AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. XL
Number 25

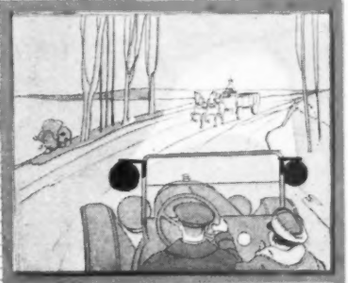
PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, JUNE 19, 1919

Fifteen cents a copy
Three dollars a year

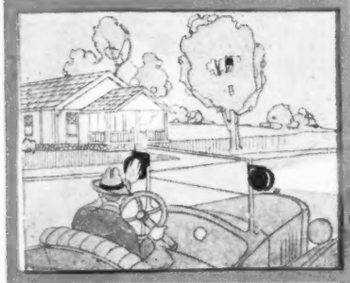
Entered as second-class matter Jan. 2, 1903, at the post-office at New York, N. Y., under the Act of March 3, 1879

Stewart

CUSTOM BILT NECESSITIES



Every car should be equipped with *two* Stewart V-Ray Searchlights.



Intense beam of light is projected 1000 feet in any direction desired.

STEWART V-RAY SEARCHLIGHT LEADS THE FIELD

Only one worthy of the name **searchlight.** "Spotlights" are mere toys beside the sturdy Stewart. Projects intense beam of light 1000 feet. Is "custombilt" the Stewart Quality Way to outlast the car.

That's why more of them are now being sold than all "Spotlights" combined. ***Order your supply today.***

HERE'S NEW IDEA! IT WILL DOUBLE YOUR SALES

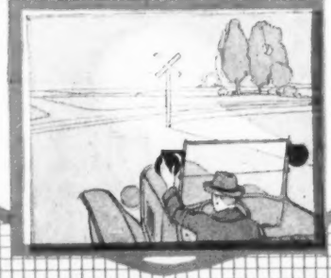
Sell every motorist **two** Stewart Searchlights instead of **one.** A new safety-first movement in vogue nationally. Motorists themselves started it. Thousands enlisting daily.

Searchlights do not blind oncomers, yet full strength, not diffused, light is always on road. Furnish safest illumination. Spread this idea. ***Double your sales. Reap the profits.***

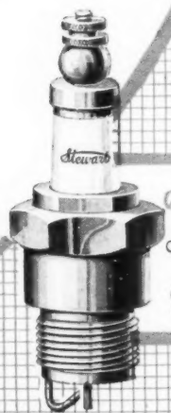
Stewart Vacuum System $12.50

$6.00 Stewart V-Ray Searchlight

"More than a Spotlight"



Picks out road signs, sharp turns, ditches and all danger spots.



Stewart Spark Plug $1.25

THE *Stewart* BIG TEN ARE ALL LEADERS IN THEIR CLASS

STEWART-WARNER SPEEDOMETER COR'N, Chicago, U. S. A.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XL NEW YORK—THURSDAY, JUNE 19, 1919—CHICAGO No. 25

Non-Stop Transatlantic Flight Brings New Problems

Pilot of the Vickers-Vimy Voices Need of More Complete Meteorological Observations—Sextant and Compass Sufficient Guide Even in Fog

CAPT. JACK ALCOCK, who piloted the Vickers-Vimy airplane across the Atlantic in 16 hours and 20 minutes, is quoted as saying in an address at Galway, Ireland, that he expected that within a year airplanes would be carrying passengers across the Atlantic.

One of the first remarks made by Captain Alcock after his arrival in Ireland was: "We must have more complete meteorological observations. We were told in Newfoundland that the conditions were favorable. Yet within an hour we plunged into bad conditions, fog and a sleet storm."

As to the machine, Captain Alcock, who is a veteran British aviator, and Lieut. A. W. Brown, his American navigator, had little to say in the way of suggestions. Captain Alcock said that he had at no time pushed his engine and that the surprising speed was the normal engine work, aided by the winds, which were favorable throughout the trip.

The fuel supply, it appears from early reports, was sufficient to have completed a flight to London, had the aviators cared to continue to that point. Their landing at Clifden, Ireland, appears to have been due to a desire to make a good landing as soon as possible and not endanger the record of their trip by continuing. They had undertaken the flight in the London *Daily Mail* competition, which required only a landing on the Irish coast. In addition both men were greatly fatigued, due chiefly to the adverse weather conditions encountered.

Lieut. A. W. Brown *Capt. Jack Alcock*

Lord Northcliffe, owner of the *Daily Mail*, whose offer of $50,000 was directly responsible for this flight, as well as that of the ill-fated Sopwith machine piloted by Harry Hawker, sent a telegram of greetings to Captain Alcock. In this, Lord Northcliffe takes a remarkable view of the possibilities of transatlantic flying. His telegram reads:

"My Dear Alcock—

A very hearty welcome to the pioneer of direct Atlantic flight. Your journey with your brave companion, Whitten Brown, is a typical exhibition of British courage and organizing efficiency.

"Just as in 1913 when I offered the prize I felt that it would soon be won, so do I surely believe your wonderful jour-

Front view

ney is the warning to the cable monopolists and others to realize that within the next few years we shall be less dependent upon them unless they increase their wires and speed up. Your voyage was made more quickly than the average press message of 1919.

"Moreover, I look forward with certainty to the time when London morning newspapers will be selling in New York in the evening, allowing for the difference between British and American time, and vice versa in regard to New York evening journals reaching London the next day.

"Then we shall no longer suffer from the danger of garbled quotations due to telegraphic compression. Then, too, the American and British peoples will understand each other better as they are brought into closer daily touch.

"Illness prevents me shaking you by the hand and personally presenting the prize, but I can assure you that your welcome will be equal to that of Hawker and his gallant American compeer, Read, whose great accomplishment has given us such valuable data for future Atlantic work.

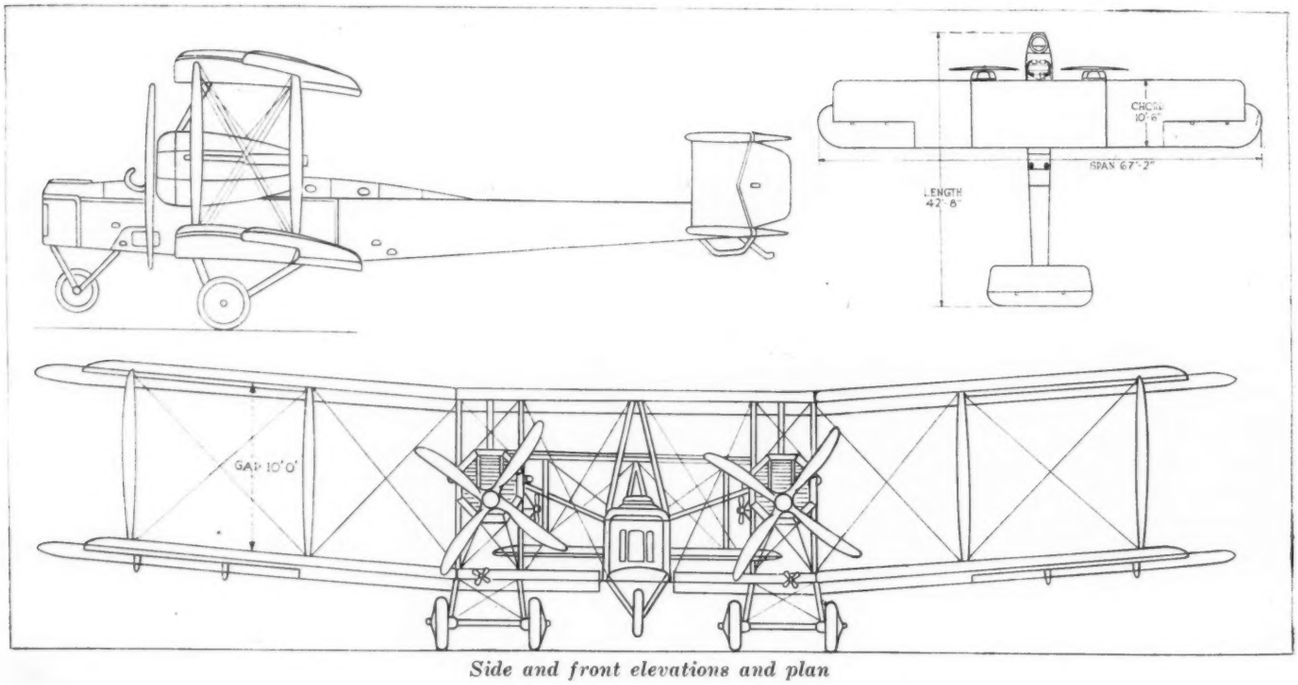
"I rejoice at the good augury that you departed from and arrived at those two portions of the British Commonwealth, the happy and prosperous Dominion of Newfoundland and the future equally happy and prosperous Dominion of Ireland.

"Yours sincerely, NORTHCLIFFE."

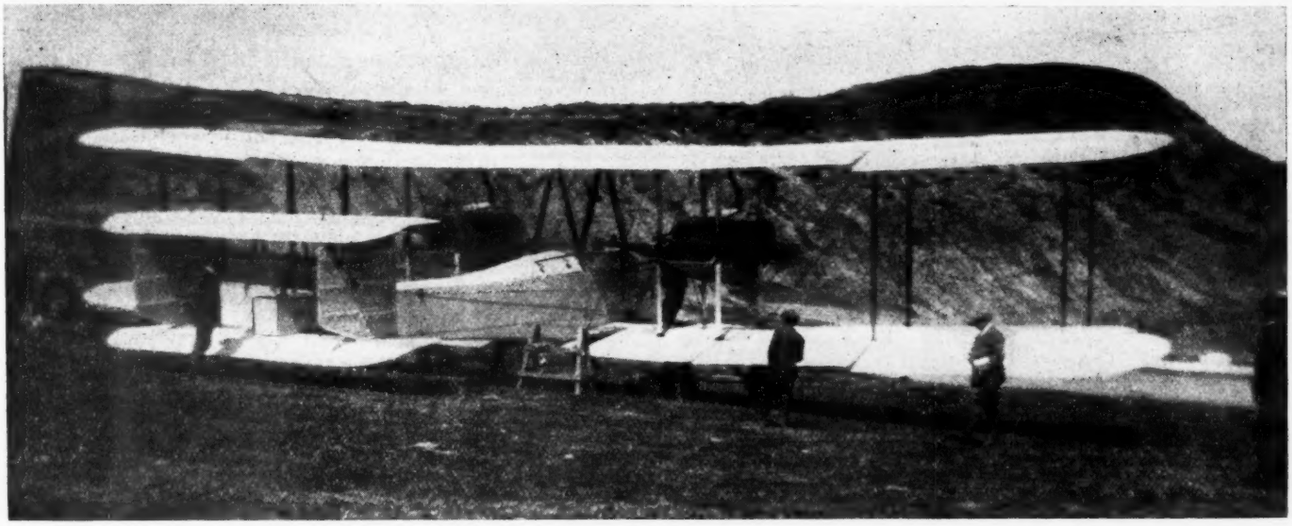
In later interviews both men spoke of the future as follows:

"The next time I cross the ocean," Captain Alcock said, "it will be in a flying boat. I foresee for the flying boat a great future, both as a passenger and commerce carrier."

On his side Lieutenant Brown remarked that the lesson gained was that marine navigation is entirely applicable to airplanes.



Side and front elevations and plan



Rear view

"There is little element of luck either in the success of the NC-4 or our flight," he declared.

"So far as weather was concerned, it could not have been worse in our case, for after the first hour we were smothered in fog until we landed in Ireland. Nevertheless, with only a sextant and compass, and a special device for determining the machine's speed and drift, we came through.

"And I am sure we could do it again."

The flight of the Vickers-Vimy was not in itself a surprise. The fact that the failure of the Sopwith machine had been due to incidental mechanical trouble—solder in the radiator—and the success of the American seaplanes in crossing the Atlantic had led the public to expect the success of this flight. The element of surprise was supplied by the speed, as apparently no one had counted upon the consistent aid of the winds for the entire journey.

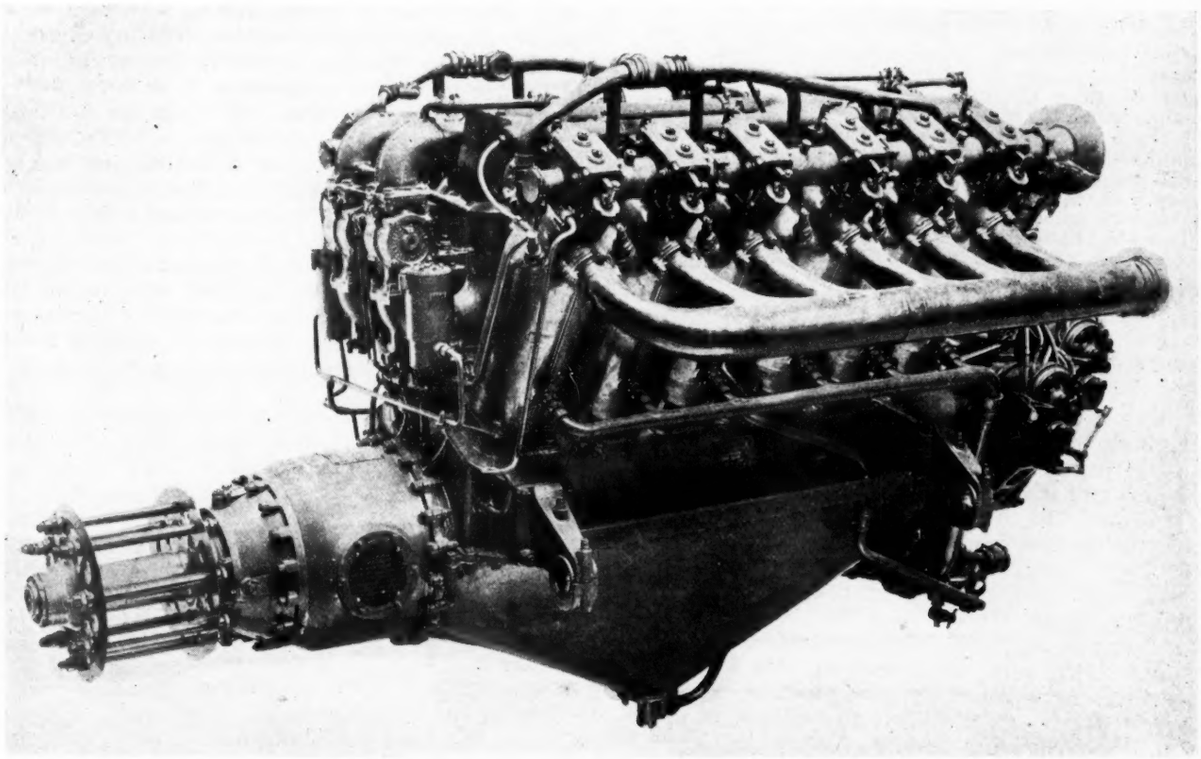
The exact record of the flight is:

Started, St. John's, N. F., June 14, 4:10 p. m., Greenwich time.

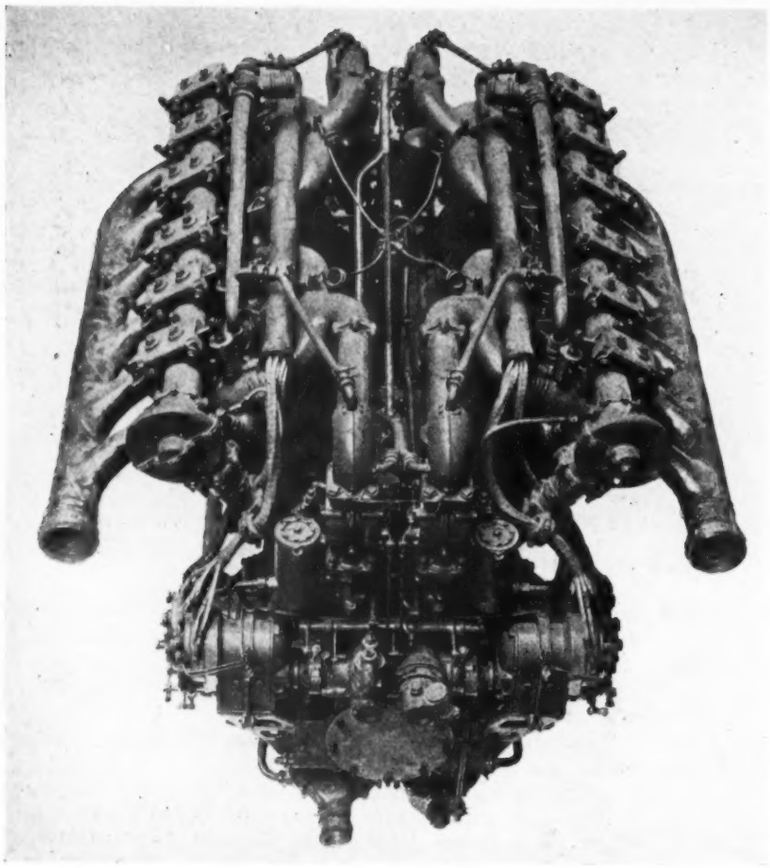
Landed, Clifden, Ireland, June 15, 8:22 a. m., Greenwich time.

Distance, 1900 miles, making an average of 120 m.p.h.

The only unfavorable feature of the Vickers-Vimy flight came at the finish, when Captain Alcock mistook a bog for a meadow and landed in it. The machine pitched forward on her nose, turned sideways, and was damaged to an extent that the plan for Captain Alcock to continue his flight to London was abandoned and the machine taken apart and removed there by freight. The two navigators made a triumphal trip to London by



Rolls-Royce 360-hp. Eagle engine with epicyclic reduction gear



Rear view of engine

boat and rail, being hailed at all stops as heroes and carried about on the shoulders of admirers.

The comparison of this flight, in a land plane built for speed, with the previous complete trip across the Atlantic by the American Naval sea planes, is:

Course	Date, May	Distance, Miles	Time, Hours	Speed, M.P.H.
Rockaway-Chatham (forced landing about 100 miles off Chatham)	8	345.45	5.45	59.87
Chatham-Halifax	14	368.42	3.51	97.87
Halifax-Trepassey	15	529.69	6.20	83.60
Trepassey-Horta	16-17	1,381.81	15.18	90.27
Horta-Ponta Delgada	20	172.72	1.45	99.83
Ponta Delgada-Lisbon	27	921.21	9.44	94.50
Lisbon-Mondego River	30	115.10	2.07	56.20
Mondego River-Ferrol	30	253.30	4.37	52.50
Ferrol-Plymouth	31	523.30	6.59	74.60
Complete Flight—				
Rockaway to Plymouth	8-31	4,519.70	57.16	78.70
Transatlantic Flight—				
Trepassey to Lisbon	16-27	2,150.00	26.47	80.30

The Vickers-Vimy twin-engined plane was originally designed as a bomber. It has a wing span of 67 ft., a chord of 8 ft. 9 in., a gap of 12 ft., and an over-all length of 42 ft. 8 in. The chief modification required by the machine to fit it for the transatlantic flight consisted in replacing its bomb-racks and bomb-dropping gear with additional fuel tanks.

When "hopping off" from Newfoundland the Vimy carried 1090 U. S. gallons of gasoline weighing about 6000 lb., as well as 50 gal. of oil.

One of the outstanding features of the Vimy plane is the strength and elasticity of its construction, which are due to the use of seamless steel tubing. This type of construction extends from the nose to well behind the planes.

The Vimy has a sturdy double under carriage, with a two-wheeled chassis placed directly under each engine. Fully loaded the craft weighs a trifle more than 13,000 lb. Even distribution of eight separate tanks and a cleverly arranged feeding system whereby the fuel is consumed at the same rate from all eight not only insured a well-balanced plane but promised an "even keel" had the fliers been forced down on the surface of the ocean.

A gravity tank at the top of the fuselage was arranged to be emptied first so it could serve as a life raft any time after the first two hours of the flight, which period was necessary to exhaust the load of gasoline contained in that tank.

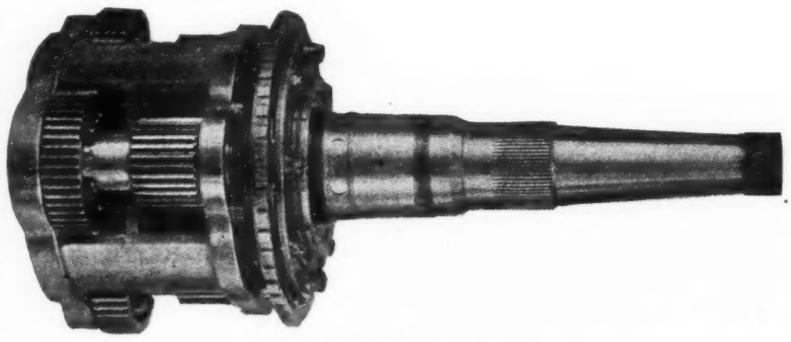
The Vimy's radio apparatus was the standard type used by the Royal Air Force, and was lent to Alcock by the British Air Ministry. It is similar to that carried by Hawker's Sopwith. The transmitting radius of this type of radio is placed at 250 miles. Messages can be received from a much greater distance.

The maximum flying speed of the machine in still air is about 100 m.p.h., but it was intended not to fly "all out," but to keep the engine throttled down to about 90 m.p.h. so as to obviate undue strains and also take advantage of the somewhat higher efficiency at this speed. Under these conditions it was figured that the Vimy had a flying range of 2440 nautical miles.

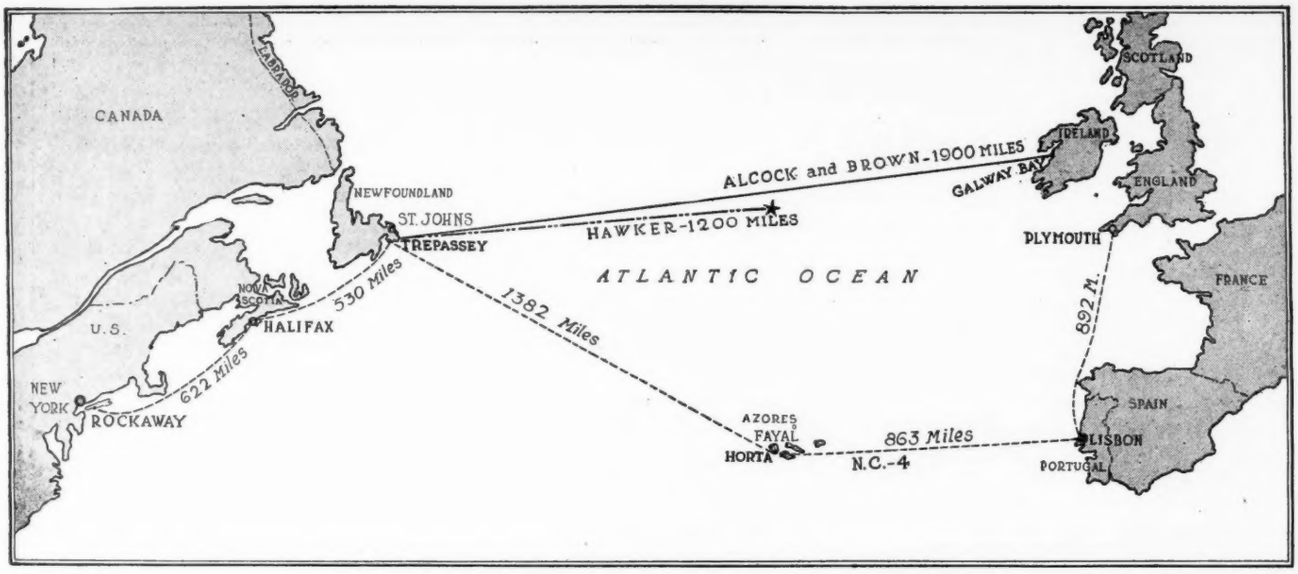
Capt. J. Alcock, D. S. C.

The pilot, Capt. J. Alcock, D.S.C., was born at Manchester, England, in 1892, and received his engineering training at the Empress Motor Works, at Manchester. He became interested in aviation in its early days and adopted it as a profession. He took the Royal Aero Club's flying certificate at Brooklands in 1912 and rapidly rose to the head of his profession, taking part in a large number of the early competition flights, among others the race from London to Manchester and return in 1913, in which he secured second place.

At the outbreak of war he immediately joined the Royal Naval Air Squadron and was assigned to Eastchurch as an instructor. Later he became the chief instructor of the Aerobatic Squadron. He did valuable work on the Turkish front, where he won the D. S. C.,



Epicyclic reduction gear



Routes followed by NC-4, Hawker and Alcock

and held the record for long-distance bombing raids. He was eventually taken prisoner by the Turks owing to an engine failure, and remained as such until the end of the war.

The navigator, Lieut. Arthur Whitten Brown, A.M. I.E.E., M.I.M.E., A.M.F.A.I.E., was born in Glasgow in 1886, and his parents were American citizens. He is an engineer by profession and received his practical training with the British Westinghouse Co., which is now allied with the Vickers Co. He received a thorough knowledge of surveying, and being interested in aviation, naturally devoted study to aerial navigation as applied to surveying. He enlisted in the University and Public Schools Corps in 1914, later receiving a commission in the Manchester Regiment, and served with the Second Battalion in France during 1915. He then transferred to the Royal Flying Corps as an observer and was wounded and taken prisoner of war in the same year. He was later interned in Switzerland, and repatriated in December, 1917, since which time he has been engaged with the Ministry of Munitions on the production of aero engines, and has put in a considerable amount of flying at home stations. He is also a pilot of some experience and has flown many types of machines.

Lieutenant Brown, after duration tests in the transatlantic "Vimy," considered he would have no difficulty in making a successful Atlantic flight. He intended to rely upon a system of navigation similar to that employed in marine navigation.

Preliminary Flights at Brooklands Airdrome

The preliminary flights were successfully carried out at Brooklands Airdrome, Surrey, by these two officers, who expressed themselves completely satisfied with the tests. The Rolls-Royce engines ran perfectly and the airplane left the ground with its load of 4 tons of gasoline and oil after running a very short distance on the ground.

The Rolls-Royce Eagle engine is a 12-cylinder machine with a bore of 4½ and a stroke of 6½ in. It is provided with a reduction gear which at a crankshaft speed of 1800 r.p.m. turns the propeller at 1080 r.p.m. At the normal speed the engine develops 360 hp., and its weight, including the reduction gear, but not including radiator, water, oil or fuel, is 877 lb.

The cylinders are machined steel forgings, fastened to the crankchamber by four bolts and having spherically shaped heads in which the valves are inserted in an inclined position. The valve ports are integral with the cylinder. Pressed steel water jackets are welded to the cylinder in two halves. It should be mentioned that a cylinder head with overhead valves is very generally regarded as the only reasonable form of cylinder-head construction for an engine working at very high mean effective pressure, to give a minimum of trouble from distortion, etc.

Articulated Pin Type Connecting Rods

The pistons are made of aluminum and are of the Zephyr type, which offers advantages from the points of view of strength, cooling, and lubrication. The connecting rods are steel forgings, machined all over, and are of the articulated pin type, that is to say, the main rod carries a pin on the big end, on which is pivoted the articulated rod, serving the other side of the engine. This type of construction makes for efficient lubrication and is an advantage from the point of view of longevity, because it permits of adjustment of the big end for wear should this become necessary.

The crankshaft is of the standard six-cylinder type, machined all over, and bored out on pins and journals to remove inactive material and to carry oil.

An interesting point associated with the crankshaft is that it forms a pipe supplying oil under pressure to all the working joints of the engine mechanism. It is fed with oil under pressure through the main bearings, and this oil is in turn fed to the connecting rod big ends, and thence up the pipes in the connecting rods to the piston pins. The oil from the crankshaft is also introduced into the epicyclic gear and completely lubricates all the parts of the gear. The oil which necessarily leaks from each end of each crankshaft bearing and connecting rod big end is flung from the cranks on to the cylinder walls, lubricating the latter freely. Oil is also fed up the connecting rods to the piston pins and articulated pins. The lubrication system of the engine is therefore what can be called a complete pressure system.

The oil is supplied under pressure from a geared pump at the rear end of the engine, which draws from an external oil tank, which is mounted in such a position that it is cooled by the air draft. An entirely separate portion of the same oil pump extracts the oil which drains into the crankchamber and returns it to the external

BLAZERS OF AIR TRAIL

1500—Jean-Baptiste Dante made flights with a glider of non-vibrant wings in Perugia, Italy.

1742—Marquis De Bacqueville used imitation flapping wings from house on Seine to garden of the Tuileries.

1842—Henson patented monoplane to be driven by steam engine. Wing span 140 ft.

1871—M. A. Penaud built toy model which flew 131 ft. in garden of the Tuileries.

1876—Penaud designed airplane with two propellers.

1896—Prof. S. P. Langley's steam-driven monoplane model flew over Potomac successfully for 3000 ft. at 20 to 25 m.p.h.

1896—Lillienthal flew biplane glider previous to fitting it with 2½-hp. engine; killed in flight.

1900—Wilbur and Orville Wright experimented with gliders with arched surfaces and adjustable rudder in front. Glided 600 ft.

1903—Dec. 17—Wright brothers fitted a biplane glider with 16-hp. engine, made first successful sustained flight in world.

1906—Sept. 13—Santos Dumont made first officially recorded European airplane flight.

1907—Oct. 26—Henry Farman, Englishman, flew Voisin 2500 ft. in 52 5/10 sec. in a straight line.

1908—Aug. 8—Orville Wright surpassed French records for duration, distance and height in flights in France.

1908—Oct. 10—Orville Wright made flight of 1 hr. duration with one passenger.

1909—July 25—Bleriot crossed the English Channel from Calais to Dover in 37 min.

1909—Sept. 29—Wilbur Wright flew around statue of Liberty.

1913—June—Brindejon flew from Paris to Warsaw stopping at Berlin, covering 933 miles in 11 hr. including stops.

1914—July—Successful trials of the "America," ordered by Rodman Wanamaker for transatlantic flight.

1914-1918—War period.

1919—Harry G. Hawker and Commander Mackenzie Grieve flew 1289 miles from St. John's, N. F., in an effort to make a non-stop flight to Ireland, when their Sopwith airplane was wrecked and the men rescued by a tramp steamer.

1919—Lieut. Commander Read and Navy crew, in the U. S. Navy airplane NC-4, made the flight from Rockaway Beach, N. Y., to Plymouth, England, 4519 land miles in 9 stages between May 8 and 31. The longest flight was from Trepassey, N. F., to Horta, Azores Islands, on May 16-17. The average speed for this entire flight was 78.70 m.p.h.

tank, after straining it to free it from dirt. In this way no oil is allowed to accumulate in the base chamber, where it would become heated up by conduction from the engine.

The crank chamber is made of aluminum castings and consists of upper and lower halves. The upper half is designed for great rigidity and its stiffness is further increased by the lower half, which is secured to it by a large number of bolts.

The drives for the camshaft, magneto and other auxiliary devices are all at the rear end of the engine. An air pump is normally mounted at the rear end and supplies air under pressure to the gasoline tank, on planes where pressure feed is used. Provision is also made for a speed indicator and for mounting a hand or electric starting gear. The water and oil pumps are also mounted on the accessories drive unit at the rear end of the engine. There is one camshaft extending across the tops of each row of cylinders, and this shaft operates both the inlet and exhaust valves through rockers. This valve operating mechanism is entirely enclosed and is fed with oil from a main lubricating system.

Ignition is by six-cylinder Watford magnetos, of which four are carried on each engine, so as to provide two entirely independent systems of ignition for each cylinder. Four carbureters are fitted, each supplying three cylinders through a branched inlet pipe. The carbureters are a special development of the Claudel-Hobson type, with adjusting means designed to take care of climatic and altitude changes.

Water is circulated by a single centrifugal pump, mounted at the rear end of the engine and delivering to the jackets at their lower ends through two pipes. Hot water is taken from the topmost point of the cylinders and conducted to the radiator through two manifolds.

During 1915 the Rolls-Royce company developed an epicyclic reduction gear which has since then been fitted to all of their engines. The question of the desirability of a reduction gear on airplane engines has been much discussed. Recent experiments have fully convinced the Rolls-Royce company that the use of a reduction gear largely increases the transmission efficiency of an engine and propeller; that is to say, much greater percentage of the available horsepower of the engine is utilized in propelling the plane. This leads to improved performance as regards both speed and rate of climb, and to an increased radius of action.

While the gain effected by reducing the propeller speed is not large on high speed airplanes in which the ratio of horsepower to total weight is comparatively high, it becomes very important in large machines which have less horsepower in proportion to weight.

The gain to be effected by the use of a reduction gear depends also upon the amount of energy lost through friction in the gearing. It is claimed by the Rolls-Royce company that with the reduction gear developed by it the frictional loss is very small and that there is, in consequence, almost invariably an appreciable increase in transmissive efficiency over an ungeared engine, even in machines of the highest flying speeds. The epicyclic type of gear adopted by the company is claimed to avoid the extremely heavy side loads on the crankshaft and crank chamber experienced with the use of ordinary spur gear sets.

This design of epicyclic gear has now been in use for four years as an aero engine reduction gear and has recently also been adopted for the Liberty engine. In the case of the Rolls-Royce Eagle engine the reduction gear adds less than 90 lb. to the weight of the engine, or less than ¼ lb. per horsepower.

Fuel and Rating Problems Discussed by Mechanical Engineers

Digest of Papers Read at Spring Meeting of American Society on Pertinent Automotive Topics

DETROIT, June 16—Papers of direct interest to automotive engineers are included in the program of the American Society of Mechanical Engineers Spring meeting, which opened here to-day. These papers deal with fuel, carburetion, airplane wings, airplane generators and engine design.

Members of the Society of Automotive Engineers were invited as guests.

The papers of principal interest to the automotive industry are: "A Suggested Formula for Rating Kerosene Engines," by D. L. Arnold, chief engineer of laboratories, International Harvester Corp.; "The Production of Liberty Motor Parts at the Ford Plant," by W. F. Verner; "Air Fans for Driving Electric Generators on Airplanes," by Captain G. Francis Gray, Lieutenant John W. Reed and P. N. Elderkin; "Standards of Carbureter Performance," by O. C. Berry. Following is a digest of these papers:

A Suggested Formula for Rating Kerosene Engines

By D. L. Arnold

A piston displacement of 13,000 cu. in. per min. is suggested as the standard for brake horsepower rating for kerosene engines by D. L. Arnold. At the present time there is no standard rating in use and as a result engines of the same bore, stroke and speed, or, in other words, the same piston displacement per minute, are given different ratings by almost all manufacturers. The conditions are such that many bills are now being introduced in the state legislatures, specifying how an engine shall be rated. If all these bills were to pass, each state might require a different rating, compelling manufacturers to furnish different name plates in each state. It is therefore suggested that the members of the Society of Automotive Engineers, co-operating with the mechanical engineers' organization, should adopt a standard rating for this type of powerplant.

The deriviation of the formulæ now in use is familiar to engineers, and it is, of course, well known that they are based on widely varying assumptions. In fact, these different formulæ give widely differing ratings for engines of the same piston displacement per minute. Reducing these formulæ to the common basis of piston displacement per minute per horsepower, the figure varies all the way from 14,000 down to 9000.

The formula suggested by Mr. Arnold is:

$$\text{Rated horsepower} = \frac{D^2LNn}{16{,}550}$$

This formula assumes that the engine is capable of developing one brake horsepower for every 13,000 cu. in. piston displacement per minute and still have a fair overload capacity, since the maximum possible output should be one brake horsepower per 11,000 cu. in. piston displacement per minute.

With a standard rating established there should also be a standard type of name plate, which includes both the horsepower and the speed at which this horsepower is developed. In other words, the plate should read: 16 hp. at 500 r.p.m., not merely 16 hp., or 16 hp. speed 1000 r.p.m., giving both rating and maximum speed of engine. In this way no doubt will be left as to what is meant.

Tractive Rating

In considering the internal combustion engine rating for tractors, the majority of manufacturers have followed the rule that draw bar horsepower should be considered as 50 per cent of the rating of the power unit. This is very conservative, but is very good considering the wide range of conditions. However, the data on the name plate should include the following:

16 Brake hp. at 500 r.p.m.
8 Drawbar hp. at 500 r.p.m. of the engine
Drawbar pull:
....lb., reverse speed at.....miles per hr.
....lb., first speed at.....miles per hr.
....lb., second speed at.....miles per hr.
....lb., third speed at.....miles per hr.
Drawbar pull and horsepower are on the average good footing.

Standards of Carbureter Performance

By O. C. Berry

Carbureter performance reports should be based more upon the actual accomplishments of the carbureter than on the engine performance alone. With this in mind it is possible to set up standards of carbureter performance which give a better knowledge of the carbureter than is obtained from the average run for this purpose.

The characteristics of the carbureter which should be known in giving expression to its performance may be

expressed as indicated in the following subdivisions:

a—The range of flow-rate capacities, or, in other words, the maximum and minimum number of cubic feet of air per minute that can be handled.

b—The richness of the mixture as affected by the rate of flow of the air through the carbureter, sudden changes in the rate of flow, and the degree of throttle opening.

c—The pressure drop through the carbureter at different rates of flow.

d—The thoroughness and uniformity with which the fuel and air are mixed.

e—The uniformity of the richness of the mixture furnished to the different cylinders.

f—The temperature and dryness of the mixture entering the cylinders.

g—The temperature of the combustion-chamber walls, particularly the piston head.

Considering these matters separately, in brief, it is found that the flow rate range is important in passenger cars, where great flexibility is desired. It is suggested that the flow-rate capacity of all carbureters should be stated definitely in cubic feet per minute, and this information should always accompany the statement of the size of the carbureter flange.

The air required by an engine may be computed by assuming that the air required per brake horsepower per minute will remain nearly constant, irrespective of the amount of gasoline used or the speed of the engine, assuming that the carbureter is adjusted so that the engine carries its full torque with wide open throttle. For the usual passenger car type of engine, with a compression ratio of about 4 to 1, this constant is about 2.1 cu. ft. per min. at full power. The air used when idling at any speed is almost exactly one-quarter of that used under full load at the same speed.

Richness of the Mixture

The richness of the mixture is expressed in pounds of gasoline per pound of dry air. With a dry mixture at half load and 1000 r.p.m., regular firing may be obtained with mixtures between 0.0575 and 0.12. The best efficiency under the same conditions accompanies a mixture of about 0.067, and the best power, 0.08.

Pressure Drop

It is impossible to obtain 100 per cent volumetric efficiency on the ordinary type engine. The drop in pressure should be measured at the throttle on the carbureter side. If designing engineers would insist on data showing the pressure drop through the carbureter necessary to give the desired rates of flow, carbureter manufacturers would soon publish guaranteed-vacuum-air-flow curves, thus making possible intelligent carbureter selection for a given service.

Thoroughness of Mixing

The best direct test of the quality of the mixing is to have the carbureter discharge into a glass-walled section between the carbureter and the manifold. The best dry mixtures appear as colorless and dry as pure air, while wet mixtures resemble a fog, and in most cases streams of liquid fuel are seen following a spiral path along the wall of the manifold.

Uniformity of Mixture

It is impossible to measure distribution accurately, but the results obtained by any given manifolds may be tested by removing the exhaust manifold and observing the flames from the exhaust opening. This can be done to best advantage in comparative darkness. By adjusting the carbureter for continuously leaner mixtures, the impoverished cylinders will be caused to miss, and then by gradually enriching the mixture the yellowish flame will indicate the cylinder with the rich mixture. Uniformity is, of course, the desired goal.

Temperature and Dryness

Often the temperature and vapor pressure are high, to maintain a dry mixture once it is established, but the time element is lacking and the mixtures are consequently quite wet. It is desirable to make the fullest use of the heat in the combustion chamber walls, piston head and compression, and to introduce the mixture into the cylinder as wet as possible, still being sure to have it dry before it is burned.

Temperature of the Combustion Chamber

When the mixture is dry as it enters the cylinders, or the fuel so well atomized that it remains suspended in the air and is entirely vaporized during the compression stroke, the heat absorbed from the combustion-chamber walls does not improve the carburetion, but decreases the power capacity of the engine without improving either its efficiency or the way it runs. These conditions, however, are rare. A considerable portion of the fuel usually enters the cylinders as a liquid which collects on the piston head. Under these conditions the temperature of the combustion-chamber walls, especially the piston head, becomes very important. The reasons for this may be explained as follows:

The piston head is usually at a temperature two or three hundred degrees above the cylinder walls. If the temperature of the walls is 200 deg. Fahr., the piston head will therefore be between 400 and 500 deg. Fahr. If the wall temperature is lowered to 100 deg. Fahr., the piston head temperature will drop to between 300 and 400 deg. Fahr. These temperatures apply to passenger car engines running under ordinary conditions. Several tests have been run at Purdue to determine the rate at which Red Crown power gasoline will evaporate from the surface of a hot iron plate. The maximum rate of evaporation seems to occur when the metal is at about 450 deg. Fahr. If the evaporation in ounces of fuel per square inch of metal per second be taken as 100 per cent at 450 deg. Fahr., then the evaporation at 400 deg. Fahr. is about 40 per cent, at 350 deg. Fahr. about 9 per cent, and at 300 deg. Fahr. about 1.8 per cent. It is therefore important that the jacket-water temperature be kept high when the piston head is depended upon to flash any considerable amount of liquid fuel into a gas. This conclusion is borne out by the engine tests. With the air entering the carbureter at 70 deg. Fahr. and the jacket water maintained at 110 deg., the engine would not fire regularly with any richness of mixture. When the jacket-water temperature was raised to 200 deg. Fahr., the engine would fire some of the richer mixtures regularly, and by raising the air temperature to 80 deg. Fahr. the engine developed full power and efficiency and would fire a wide range of mixtures.

The Production of Liberty Motor Parts at the Ford Plant

By W. F. Verner

This paper deals with the production of Liberty engine cylinders and connecting-rod crankshaft bearings as carried on at the Ford Motor Co.'s plant at Detroit. The contract made with the United States Government called

for 5000 engines, and these were to be produced at the rate of fifty per day of eight hours. To do this, important developments in the methods of manufacture were brought about by the production department.

One of these was the method of producing cylinders from tubing. Six operations were necessary, and the author describes them in detail. The methods employed to produce connecting-rod crankshaft bearings likewise resulted in a great saving of time. Twenty-one operations were found necessary for this work, and a complete description of each is given. The paper concludes with an explanation of the method of installing bearings in the upper and lower halves of the Liberty engine crankcase.

Air Fans for Driving Electric Generators on Airplanes

By Capt. G. Francis Gray, U.S.A., Lt. John W. Reed, U.S.A., and P. N. Elderkin

In this paper the authors briefly describe the method employed by the Radio Development Section of the War Department in testing air fans used for driving the electric generators usually installed on airplanes for radio communication. They also discuss at some length the various types of air fans and present numerous photographs and curves clearly illustrating the construction of the fans and their operating characteristics.

The difficulty of the problem lay in designing a fan which would turn at constant speed in the air streams of widely varying speed set up by the airplane in flight. The various types of fans tested were: Fixed blade fans of special blade shape; fixed blade fans with wind brakes centrifugally regulated; fixed blade fans using a friction clutch or a friction brake centrifugally regulated and pivoted-blade fans with pitch centrifugally regulated.

Tractor Brake and Drawbar Horsepower Rating

By R. O. Hendrickson

I ATTENDED a meeting of the Tractor Standards Division of the Society of Automotive Engineers, and, while we did not come to any conclusion in reference to satisfactory ratings, it is expected that same will be voted upon June 23, and I might tell you that the tentative suggestions in regard to this which were put forth by those present were not entirely satisfactory to me. The ratings recommended were briefly as follows:

$$\frac{0.7854\,D^2LRN}{13{,}000} = \text{Brake horsepower}$$

$$\frac{0.7854\,D^2LRN}{26{,}000} = \text{Drawbar horsepower}$$

You will note that 13,000 cubic inches displacement per minute per horsepower is the constant used in figuring the brake horsepower, while the accepted A. L. A. M. formula for rating automobile engines is based on approximately 11,733 cubic inches displacement per minute per horsepower. The larger constant was thought desirable for rating tractor engines on account of the heavier work they are called upon to do and also on account of the fact that kerosene, which is largely used in tractor work, is supposed to develop less brake horsepower in a motor of a given size than is the case in the automobile where gasoline is used. Our experience, however, with kerosene is that the maximum power with a properly designed motor is almost exactly the same as when using gasoline. You will note that in calculating the drawbar horsepower they have considered merely doubling the constant, which would result in a drawbar power equal to 50 per cent of the brake horsepower.

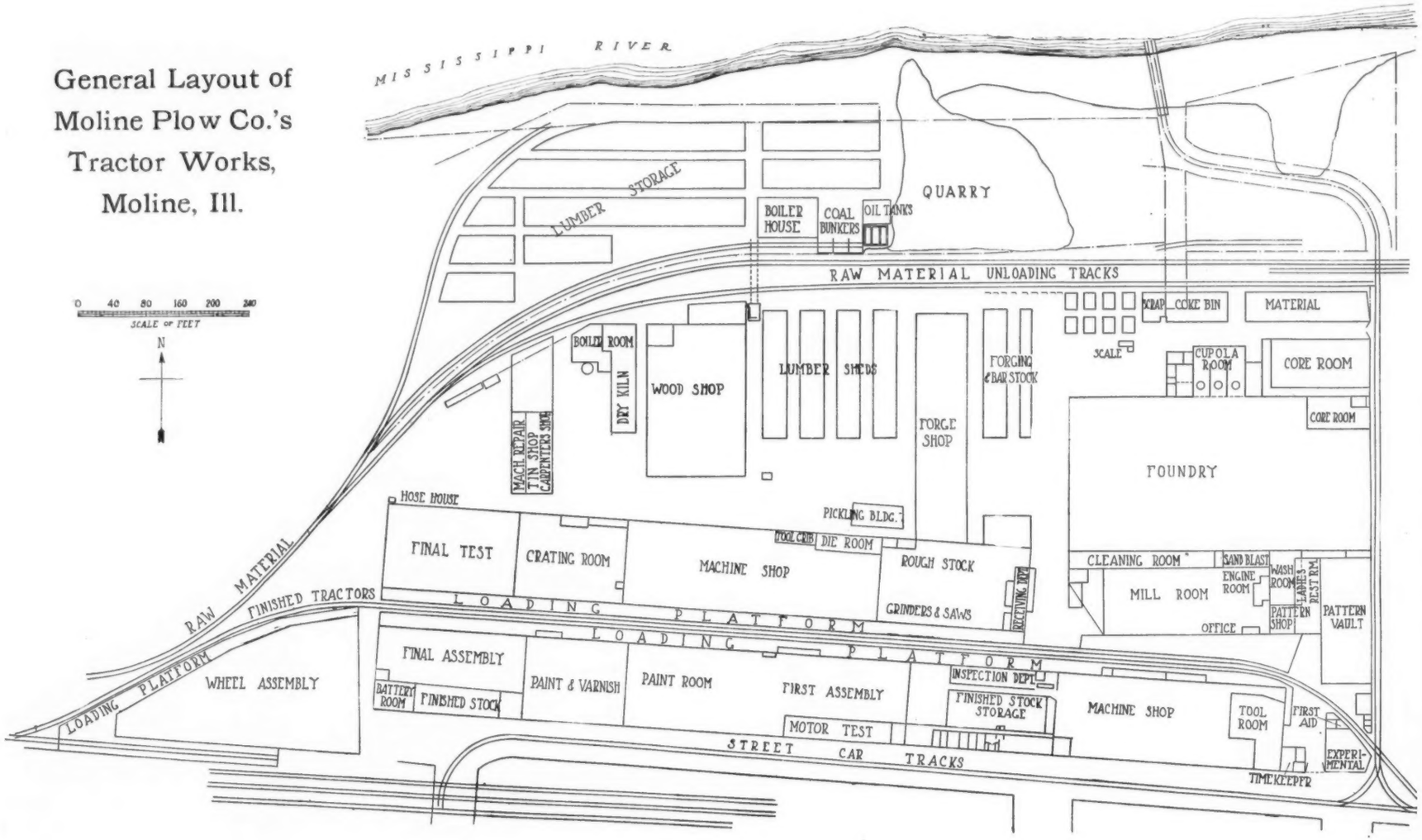
My objection to the brake horsepower formula, as recommended, is that it does not fix a piston speed. It seems to me that, since within quite a wide range of speed the horsepower of a motor varies in almost direct proportion to the speed, and since the speed at which a motor is driven largely determines its life or endurance, a piston speed should be assumed in the formula, inasmuch as the wide variation in stroke of different motors and the fact that the arbitrary r.p.m. quoted by the manufacturer is used in the formula. In other words, the r.p.m. used in the formula should be based on a given number of piston feet traveled per minute. This would then give the formula a value which it certainly has not when the r.p.m. factor used is established according to the ideas of the engine maker. For a motor to endure and to be efficient it should not run at an excessive piston speed, nor at one too low. As the formula stands the engine maker is at liberty to state any r.p.m. he desires, which certainly would not be the case if the factor of r.p.m. were based upon 850 piston feet per minute, which we have found to be the most logical and satisfactory with our various sizes of motors for tractor work.

To make a long story short, we could use the formula outlined above and rate our motor either 25 brake horsepower or 50 brake horsepower, all depending upon what figure we decided to use for the r.p.m. If the piston speed were fixed at 800, 850 or 900 r.p.m. and the r.p.m. determined from this, then all makers of tractor engines would be rating their engines on the same basis, whereas as the formula stands it means nothing, at least that is the way it seems to me.

In regard to drawbar rating, this, it would seem to me, is almost impossible to establish, for several reasons as follows: First, the weight of the tractor in relation to the wheel diameter and width has a great deal to do with the rolling resistance of the tractor; second, the weight distribution has a great deal to do with the pulling capacity of the tractor as a whole; third, the weight of the tractor in relation to its motor horsepower has a great deal to do with the power available at the drawbar; fourth, the fact that the rolling resistance of a tractor requires all the way from 5 per cent to almost 100 per cent of the power of the tractor, due to soil conditions, is the worst of all, and it seems to me that to start off and rate a tractor motor with a formula where the piston travel is arbitrary according to the ideas of a man who rates the particular motor, and then to take 50 per cent of that as the drawbar horsepower, and in view of all the variable factors as outlined immediately above one has information of very little value when the calculation is finished.

(*Continued on page* 1418)

General Layout of Moline Plow Co.'s Tractor Works, Moline, Ill.



While a certain amount of work is being done in this plant for the implement section of the Plow Works, most of it is devoted to tractor production. It is hoped to increase the daily production, which was about 55 tractors early this year, to about 150 by July 1

Production Features of the Moline Plow Tractor Works*

Two-Wheeled Tractors Produced According to Systematized Plan Similar to That in Automobile Plants—Shops Are Equipped with Modern and Exclusive Machinery, and Capacity Recently Was Tripled

By P. M. Heldt

FARM tractor plants employing production methods comparable with those in vogue in the automobile industry are very few in number. The reason is that the tractor industry is still very young, and there has been insufficient time to standardize and systematize. Tractor design, moreover, is not yet settled to any extent, and there is naturally considerable risk involved in investing heavily in tools and equipment that may be rendered obsolete by a change in design. A few manufacturers in the tractor field, however, have had the courage to go ahead and install the necessary equipment for the production of tractors on a large scale by the most up-to-date methods. One of these is the Moline Plow Co., whose tractor branch is at Rock Island, Ill.

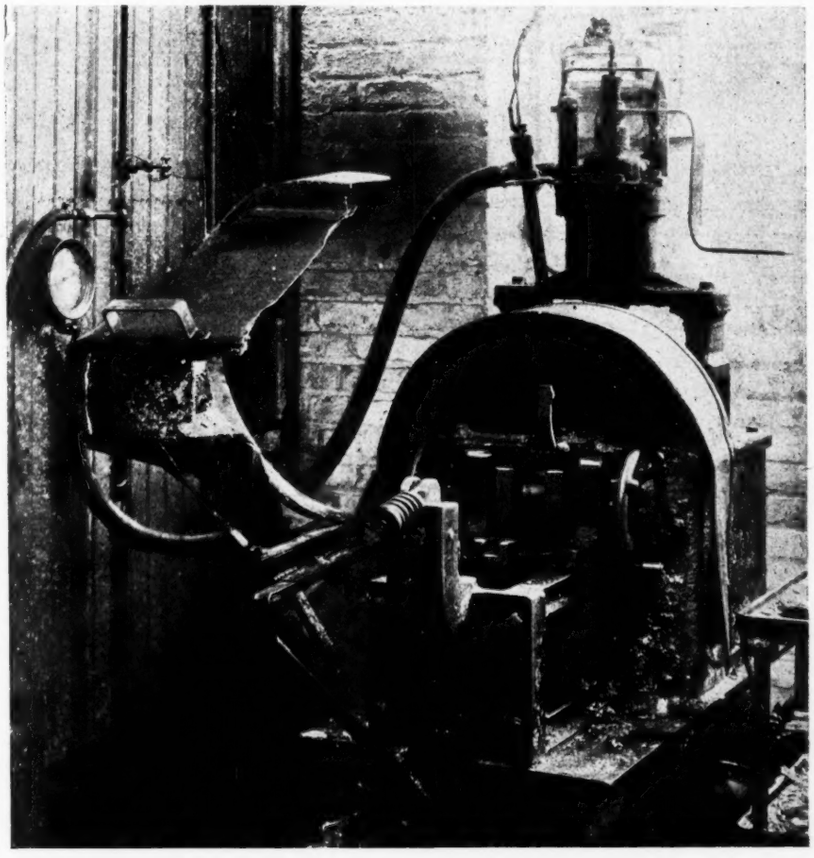
When the writer visited the Moline plant last March, the daily production was about 55 tractors. It was then planned to increase this to 150 tractors a day by July 1, without any material enlargement of the plant. This involved considerable rearrangement of departments and the installation of much new machinery.

The plant comprises a large and modernly equipped foundry, measuring 280 x 360 ft. The location of this with respect to the other departments of the works may be seen from the plan herewith. All raw material is received over a railway siding alongside of which are located a material storage shed, coke bins, scrap shed, etc. There are two rooms, one in one corner of the foundry building, the other one in a separate building. All of the simpler and lighter core work is done by girls, and this department is separated off from the main core room. There are benches extending in front of the core ovens, on which the core makers place the finished cores, whence they are transferred to the ovens. West of the main core-making room is a core storage room, and an overhead monorail extends into this room, so that heavy cores can be handled by power. A new spur from the Chicago, Milwaukee & St. Paul Railroad has just been laid down at the rear of the plant.

There are three cupolas in the foundry, and a total of 39 tons can be melted in each per day. The total number of hands in the foundry at the time of the writer's visit was 300, of which 90 were employed in the core rooms. The foundry is equipped with all the latest machinery devised for this class of work, including an electric sand cutter, moulding machines, strippers, etc. A good many castings are made in this foundry for the implement branch of the Moline Plow Co. The cast bull gears of the Moline tractor, which are one of the most important castings on the machine, are made by moulding machines developed by the concern's production experts. This is a hand ram roll over stripper for the drag. The teeth are made of dry sand and set into the mould, while for the cope an ordinary plate is used, which is lifted off with an air hoist.

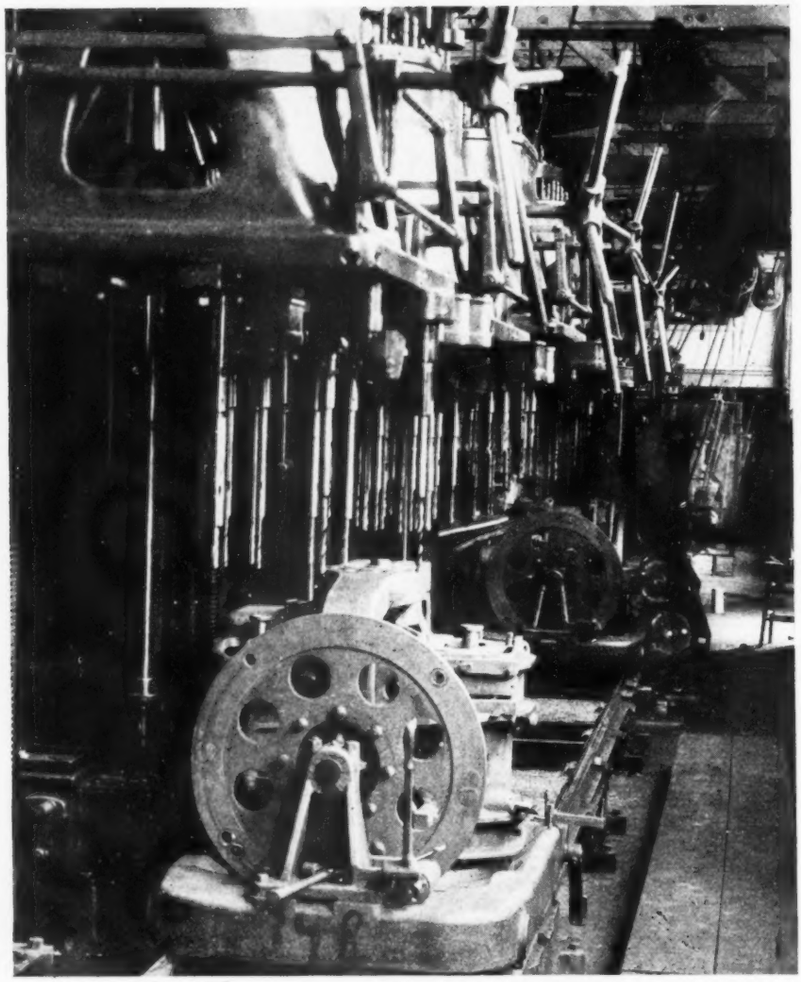
Two of the three cupolas are lined down to 68 in. in diameter, while the third is lined down to 58 in. Use is made of two No. 6½ and one No. 6 Root blowers.

A system for wetting the sand in the foundry at night has been introduced. The whole foundry is divided into floors, or sections, and over each floor there is a sign bearing the number of cubic feet of water required for

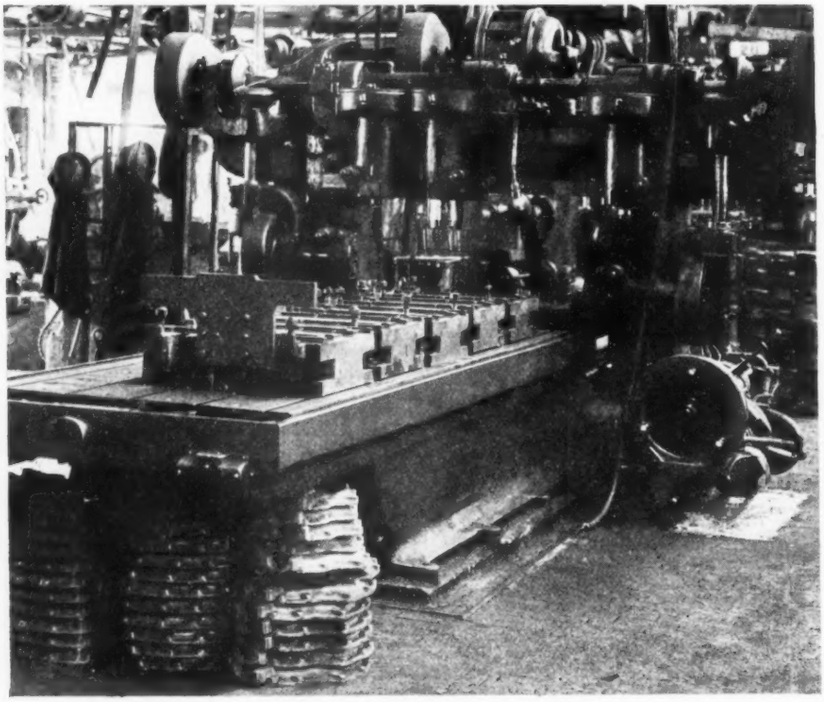


Machine for babbitting big ends of connecting rods (die-casting method)

*A continuation of this article next week will be devoted to the assembly and testing plant.



Railroad gang drill with tumbling jig in which transmission housing is handled while 100 holes are drilled in it



Ingersoll continuous milling machine in which six surfaces on the transmission housing are milled in one operation

it. One man waters the whole foundry. He carries a water meter at the end of a 50-ft. hose, on a harness, in front of him. Faucets are distributed throughout the foundry, so that this 50-ft. length of hose will enable him to reach any part. The water thus added to the sand exactly makes up for the evaporation during the day, not only for the whole foundry, but for each separate floor as well.

A Pangborne sand-blasting equipment is installed, and some of the castings are carefully cleaned, particularly the bull gears and transmission cases. The cases are first cleaned of all core sand, then tumbled, then chipped, then sand-blasted and ground, and finally they are inspected. A monorail system extends over the whole foundry, and the melted iron is handled in ladles having a capacity of 800 lb. each. Iron is melted at the rate of 15½ to 16 tons per hour. Castings are delivered to the mill room in two-wheeled handcarts.

The plant also has a small brass foundry, and at the time of the writer's visit two men were employed there. There are very few brass castings in the tractor, and most of the work done in this foundry is on patterns and aluminum plates. The foundry is of saw-tooth roof construction, and therefore has very good daylight.

To the south of the foundry is the first cleaning room, where the cores are knocked out of the transmission cases. Next comes the mill room, where the castings are chipped and ground. At the eastern end of the mill room is the pattern shop, and over this is a girls' rest room. To the east of this is a pattern vault.

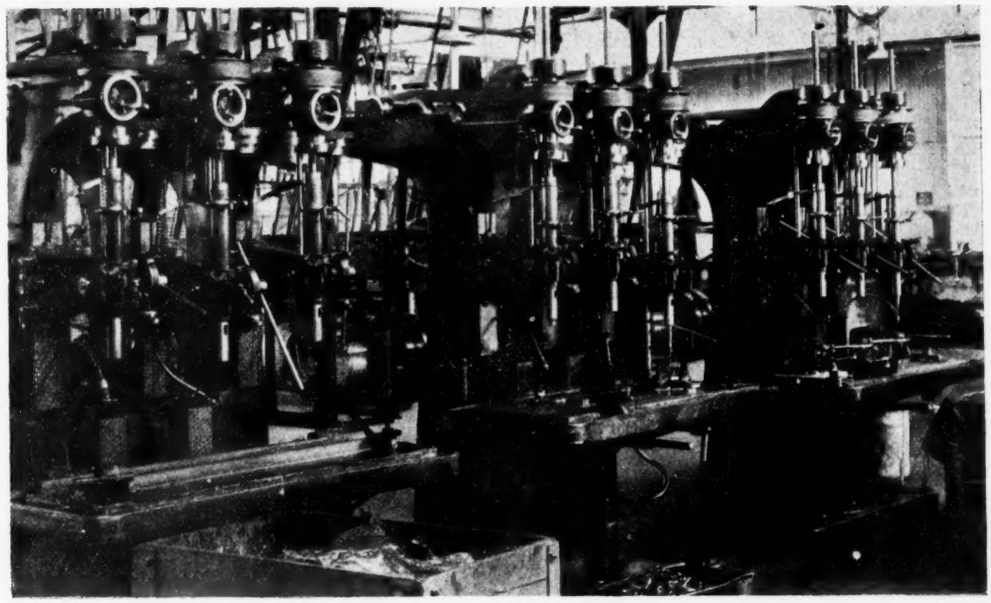
After the castings come out of the mill room they are stacked on a platform, alongside of a spur of the Chicago, Rock Island & Pacific Railroad.

There are two machine shops in the plant, referred to as shop A and shop B respectively. The most important part, in many respects, of the Moline tractor —the one on which the greatest number of machine operations are performed, and which forms the nucleus around which the whole tractor is assembled— is the transmission housing. The castings from which these transmission cases are made are received in machine shop B, and are faced on a Diamond surface grinder for the first operation. All of the machine tools in which this part is handled are naturally of the heavy type, and it is worth pointing out that there is a Richard-Wilcox crane over these heavy tools, so that the cases can be transferred from one tool to another by power. In addition, there are air hoists on swinging arms in this department.

After the first grinding operation the cases go on to an Ingersoll milling machine, which takes 9 cuts at one time. The cases are bored at the same time.

Some of the machine operations on the cases are as follows: First, the open end which bolts to the engine crank case is ground. Next, dowel holes are bored. In the next operation six plane surfaces are milled, and in the following operation four more surfaces are milled. Next, three holes are bored in Beaman & Smith horizontal boring machines. This operation comprises both rough and finished boring. Next follow two boring and facing operations, and after this the case goes to the drill presses.

There is a total of 100 holes to be drilled in this part, ranging in size from 5/16 to 1 7/16 in. A set of four No. 30 Natco multi-spindle drills and two radial drills are used for this purpose, and the casing is handled in a tumbling jig, mounted on a truck on a track in front of the drills. It takes just 6 minutes to drill these 100 holes. All of the tapping required on the case is also done by power machines, the Hammond radial tapping machine being used. There is a gang of 6 of these machines, and the work done by them includes tapping 74 holes, reaming of one, and spot facing of two.



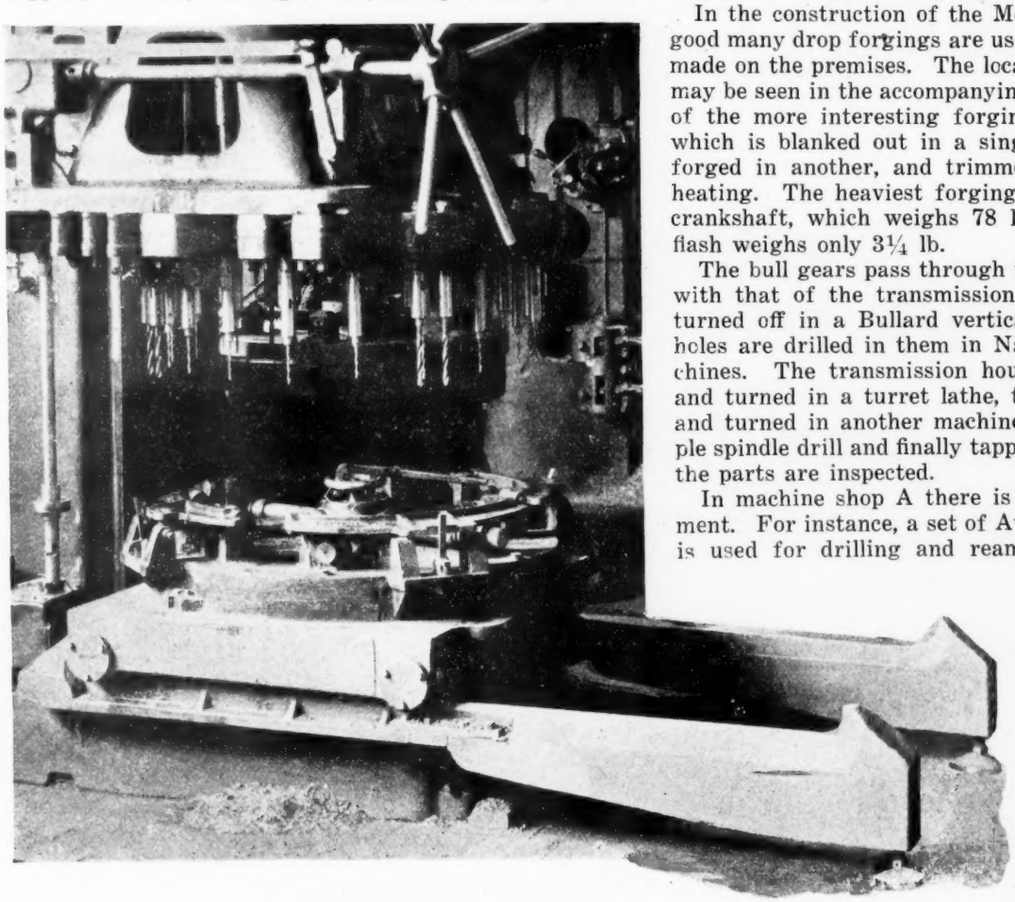
Avery 3-spindle power drills for drilling and reaming (central spindle for reaming)

The drilling and tapping completes the machine operations on the cases, and they are then washed in soda solution, in which they are dipped. After drying they are painted inside by means of the spraying process. The cases are moved about the floor on electric trucks. There is an inspection of the cases between each pair of operations, and even between the drilling and tapping. After the cases have been cleaned and painted on the inside, they go to the assembling department.

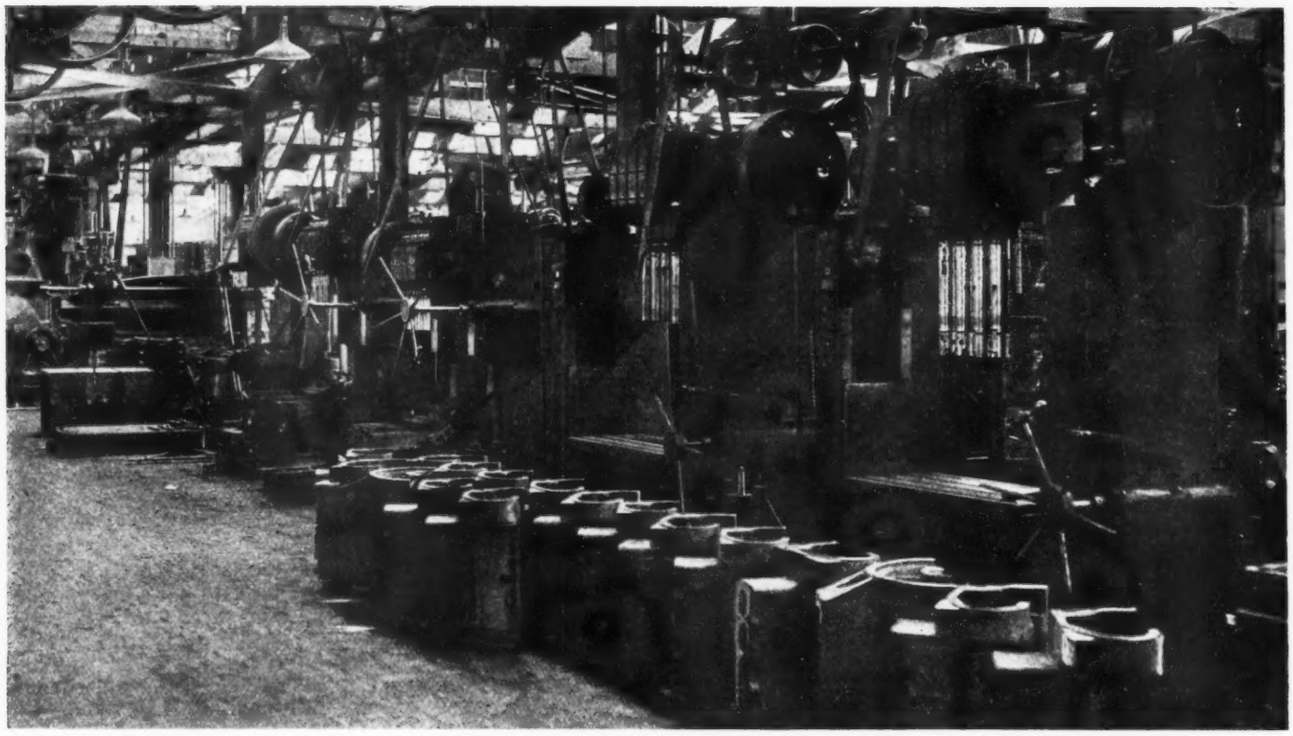
In the construction of the Moline Universal tractor, a good many drop forgings are used, and these forgings are made on the premises. The location of the forging plant may be seen in the accompanying plan of the works. One of the more interesting forgings is the clutch shifter, which is blanked out in a single piece in one hammer, forged in another, and trimmed in a third, all in one heating. The heaviest forging made in the shop is the crankshaft, which weighs 78 lb. in the rough, but the flash weighs only 3¼ lb.

The bull gears pass through the shop on a line parallel with that of the transmission cases. These gears are turned off in a Bullard vertical boring mill. Next, 26 holes are drilled in them in Natco multiple drilling machines. The transmission housing end is bored, faced and turned in a turret lathe, then bored, faced, reamed and turned in another machine, then drilled in a multiple spindle drill and finally tapped. At the end of the line the parts are inspected.

In machine shop A there is a great variety of equipment. For instance, a set of Avery 3-spindle power drills is used for drilling and reaming forgings, the center spindle being used for reaming. Next to these drills there are several Lapointe broaching machines, used for broaching key holes. One operator attends two of these broaching machines, while in the



Multiple spindle drill and jig used for drilling bull gears



Four-spindle cylinder boring machines

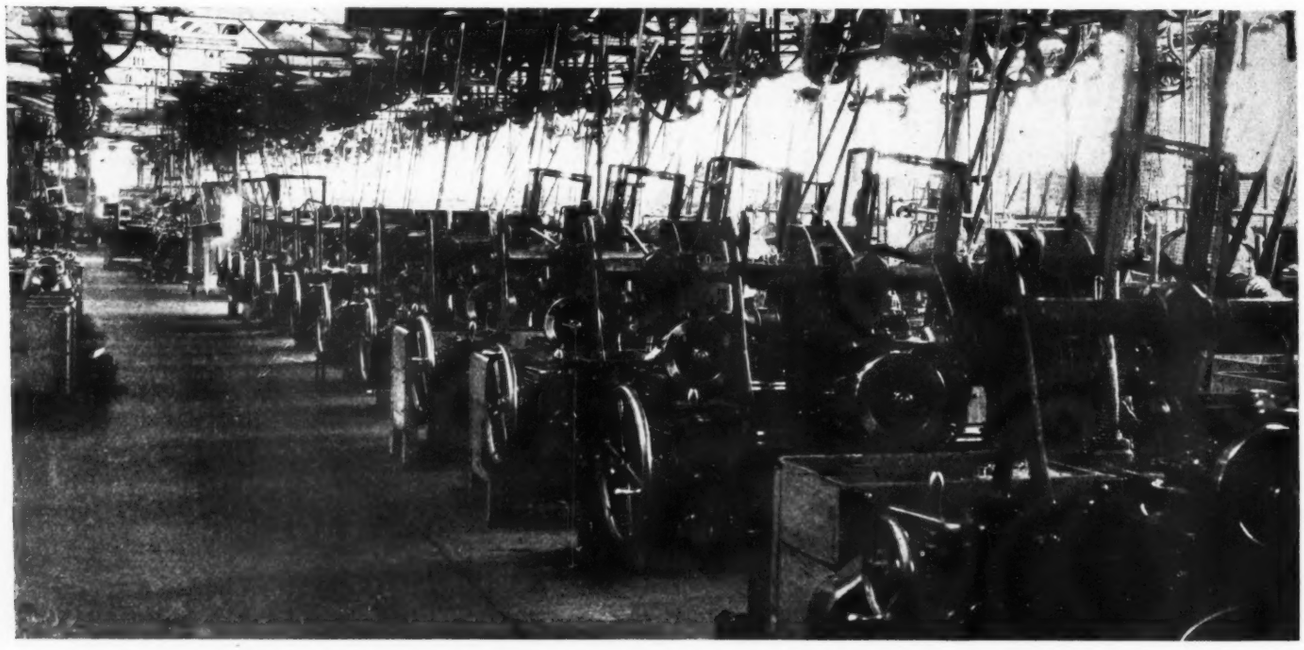
case of the automatics, one man looks after three machines.

A somewhat unusual tool for a tractor factory is a Pratt & Whitney rifle drill, which is used for drilling holes 7½ in. deep in the clutch shaft. The drill is a two-spindle machine, and drills two shafts at one time.

A uniform type of parts box is used throughout the plant, these boxes being made of 1-in. boards, which are bolted to angle-iron corner pieces, the angle iron being extended to form legs. Elevating trucks are used for carting these boxes around.

At the end of machine shop A there is a metal washing machine, in which the greasy parts, as they come from the machine tools, are cleaned in Oakite. A continuous chain conveyor operated by an electric motor draws the material through the Oakite vat. As the cleaning fluid is at a high temperature, the parts dry quickly after being removed from it.

(To be concluded)



Barber-Coleman gear hobbers. Note the parts boxes alongside these machines

Parcel Post Development Must Keep Up with Export Trade

EVERY person interested in export trade, whether for a large or small article of merchandise, has realized the value of an adequate parcel post service. The following article sets forth the present status of that service and indicates some of the immediate needs. It also advises that if the service does not meet with your requirements, you take up at once with the Second Assistant Postmaster General such changes as will help your business.—EDITOR.

By Allen Sinsheimer

THE rapid growth of the American export trade has served to call attention to the great advantage of an adequate parcel post service as a part of the foreign trade equipment. The quick development of the trade with the Latin-American and other countries that formerly did not buy freely from this country developed defects of the service more rapidly than they could be overcome while war conditions obtained.

Recently considerable progress has been made in overcoming these disadvantages, but trade conferences have shown that there remains a wide field for this work. In the automotive trade, the parcel post is invaluable for the shipment of small parts.

During the war many countries suspended parcel post service, but most of these have resumed, and other nations, with which the United States Post Office Department has recently negotiated, have completed parcel post conventions. A list is published herewith of the countries and the exchange post offices which dispatch and receive parcel post mails, including the countries which have resumed parcel post service interrupted by the war, those countries which have recently agreed to receive parcel post from the United States and those which have increased the weights of the parcels.

Rates Chief Obstacle to Parcel Post

The chief obstacle to extensive use of parcel post has been found in the rates and in regulations of certain nations. Maynard D. Howell, export manager of Montgomery Ward & Company, discussing this subject at the recent Foreign Trade Convention, pointed out the great advantage enjoyed by British shippers, as compared with American exporters, because of the lower rates from London as compared with those from, for example, Chicago.

Instances cited show that a 3-lb. package parcel post from London to Johannesburg costs 84 cents, a 7-lb. package $1.20 and an 11-lb. package $1.80 as compared with mail from Chicago at $1.56 for 3 lb., $3.48 for 7 lb. and $5.40 for 11 lb. Similarly, the rates to Spain, India and other countries are greatly in favor of the British shipper.

Express rates to the same points are frequently 500 per cent higher. This gives the British automotive manufacturer an important advantage. He can ship a package of spark plugs, for instance, weighing 11 lb., to Singapore for 72 cents, as compared with $5.40 from Chicago.

Furthermore, there are many of the British colonies with which the United States has no parcel post arrangement, and the only method of shipment is from the United States to England. Consequently, the automobile dealer in Nigeria, for example, can ship to this country through British parcel post, but the American manufacturer cannot ship to him except by employing an agent in London and paying postage from America to London and from London to Nigeria.

Another important obstacle is in the restrictions in certain countries, especially in Latin America, and the heavy customs duties and the complicated customs regulations in Argentina, Brazil, Cuba and other countries. Shipments to Argentina encounter a delivery fee of 30 cents, internal revenue taxes, customs duties and charges for the intervention of the customs broker, which frequently exceed the value of the contents of the parcel. Further, there are levies for storage, statistics and for return of undeliverable parcels to the point of origin.

Argentine Regulations

The parcel post administrator of Argentina insists on collecting postal charges for the return of undeliverable parcels, and, as there is no money order convention in force between the United States and Argentina, the method of payment is through postage stamps only and is cumbersome.

Venezuela charges a delivery fee equal to 30 cents for each parcel, regardless of weight, and the restriction that 44 lb. of merchandise of one sort is the most that may be imported by parcel post into Venezuela by one addressee, in the same mail, except on condition of the increase of the customs duties and other charges, causes unnecessary delays.

The chief difficulties in the Brazilian parcel post arise from the fact that the service is strictly limited to a few large cities, including Rio de Janeiro, Sao Paulo, Bello Horizonte, Bahia, Pernambuco and Para, and parcels addressed to other destinations can be delivered only when arrangements have been made by the addressee for their transmission through one of these above-mentioned post offices.

The United States Post Office can only accept parcels for delivery beyond these offices at the owner's risk. Brazilian authorities also provide that parcels must bear the amount necessary for return postage, if they are undeliverable, and the lack of a money order convention between the two countries necessitates the employment of coupons forwarded through the Post Office Department for the pre-payment of return postage.

The Bolivian parcel post was highly praised at the recent Pan-American Convention by an American ship-

per, who told of 300 parcels sent to that country, all of which had reached their destination in good condition. At the same time, there are reports from other sources that a considerable number of packages shipped to Bolivia are rifled in transit and that it is difficult to fix the responsibility for this, because the parcels are conveyed by sea to Mollendo, a Peruvian port, and require land transit through Peru.

The lack of direct communication from the Peruvian ports to eastern Peru, across the Andes, limits the service to that country. Similarly, the long transit and frequent handling of parcels to Ecuador via the Isthmus of Panama hinders successful operation of the service to that country, and this, with the fee of 24 cents for the delivery of each parcel, regardless of weight, in Ecuador, hampers the usefulness of the service.

Because of the provision in the American legislation relating to the United States and Cuba limiting shipments of cigars to parcels containing not less than 3000 cigars, Cuba feels that she would be placed at a disadvantage if she entered into a convention with the United States. Requests to Congress for a repeal of this restriction have not been complied with.

The recent conclusion of a convention with Great Britain whereby parcel post arrangements have been completed between the United States and South Africa, via the English mails, is an important step toward improvement of foreign trade relations with that country, which with Liberia forms the only section of Africa enjoying parcel post service with the United States.

Exporters favor a change in our parcel post rates so that the rate will decline with increase in weight. This is the system employed by Great Britain whereby parcel post to nearly all countries costs less per pound the heavier the package, until a minimum rate is reached. The United States has a uniform rate of 12 cents per pound, whether for 1 lb. or for 20 lb. Some of the countries with which the United States has parcel post conventions limit the parcels to 11 lb. maximum, and this has been objected to by shippers, who are requesting an increase to 22 lb.

Packing regulations in some countries, for example Italy and France, require the employment of waterproof paper for some commodities, and wooden boxes with burlap for others. These requirements are exacting and are so much more rigid than the American regulations, which merely require that every parcel must be securely and substantially packed so that it can be opened with-

Parcel Post Relations With the Following Countries Was Not Interrupted During the War. The Exchange Post Offices for These Countries Are Named:

Names of Countries	Exchange Post Offices	
*Argentina	New York, San Juan	Buenos Aires
*Australia, including Tasmania	San Francisco, Honolulu	Sydney, Melbourne, Brisbane, Adelaide, Perth, Hobart, Launceton
Bahamas	San Francisco, Honolulu	Nassau
*Barbados	San Francisco, Honolulu	Bridgetown
Bermuda	San Francisco, Honolulu	Hamilton
Bolivia	New York, San Francisco	La Paz
Brazil	New York, San Juan	Bahia, Para, Pernambuco, Rio de Janeiro, Sao Paulo
British Guiana	All offices authorized to exchange mails between the two countries.	
China	San Francisco, Seattle, Honolulu	
Colombia	All offices authorized to exchange mails between the two countries.	
Costa Rica	All offices authorized to exchange mails between the two countries.	
*Curacao (including Aruba, Bonaire, Saba, St. Eustatius and the Dutch part of St. Martins)	New York, San Juan	Willemstad
Dominican Republic	New York, San Juan	Santo Domingo
Ecuador	New York, New Orleans, San Francisco	Guayaquil
*Dutch Guiana	New York	Paramaribo
*France (excluding Algeria and Corsica)	New York	Cherbourg, Havre
*French Guiana	New York, San Juan	Cayenne
*Gibraltar	New York	Gibraltar
*Great Britain and Ireland	New York, Chicago, Boston, Philadelphia, St. Louis, Baltimore, San Francisco	London, Liverpool, Dublin
Guatemala	New York, New Orleans, San Francisco	Guatemala City, Retalhuleu, Puerto Barrios
*Guadeloupe (including Marie Galante, Deseade, Les Saints, St. Bartholomew and the French portion of St. Martins)	New York, San Juan, P. R.	Basse-Terre
Haiti	New York, San Juan	Cape Haiti, Port au Prince
Honduras (British)	New Orleans	Belize
Honduras (Republic of)	New York, New Orleans, San Francisco	Tegucigalpa, Puerto Cortez, Amapala, Truxillo
Hong-Kong. See Section 186	San Francisco, Seattle, Tacoma, Honolulu	Hong-Kong
*Italy (including Rep. of San Marino, Italian Colonies of Benadir and Erythrea, and the Italian offices at Bengazi, North Africa and Tripoli-in-Barbary and the Aegean Islands of Carpathos and Rhodes)	Philadelphia, Chicago, New York, Boston	Naples
Jamaica, including the Turks, Caicos Islands and Cayman Islands	Boston, Philadelphia, Baltimore, San Juan	Port Anton
Japan, including Formosa, Karafuto (Japanese Saghalien) and Korea. See section 186	San Francisco, Seattle, Tacoma, Honolulu	Yokohama, Kobe, Nagasaki
Leeward Islands (Antigua with Barbuda and Redonda, St. Kitts, Nevis with Anguilla, Dominica, Montserrat and the Virgin Islands, British)	New York	St. John, Antigua
*Martinique	New York, San Juan, P. R	Fort-de-France
Mexico. See section 2	All offices authorized to exchange mails between the two countries	
*Netherlands, East Indies.	San Francisco	Tandjongpriok
Newfoundland	New York, Boston, Philadelphia	St. John's
New Zealand, including Fanning Island	San Francisco, Honolulu	Auckland
Nicaragua	New York, New Orleans San Francisco	Bluefields, San Juan del Norte, San Juan del Sur, Corinto
Panama. See section 2	New York, New Orleans San Francisco	Colon, Bocas del Toro
Peru	New York, New Orleans, San Francisco	Lima
Portugal	New York	Lisbon
Salvador	New York, San Francisco	San Salvador
*Society Islands	San Francisco	Papeete
Trinidad, including Tobago	New York	Port of Spain
*Uruguay	New York, San Juan	Montevideo
Venezuela	All offices authorized to exchange mails between the two countries.	
Windward Islands (Grenada, St. Vincent, the Grenadines and St. Lucia)	All offices authorized to exchange mails between the two countries	

*Parcels cannot be registered.

out damage to its cover by postmasters and customs officials, that our shipments are frequently held up because they do not meet the foreign regulations.

The fault lies in the failure of the authorities here to negotiate conventions abroad which will recognize our methods of packing. This difficulty is also encountered in Argentina, where the American Consul General reports "because their treaty provisions are better, the parcel post service of other countries is better than ours."

The importance of extending parcel post facilities and providing for equitable service with all nations was shown recently in the instance of an automotive manufacturer who was attempting to place his literature in foreign countries. He found that the duties to the South American ports are so high that he could only ship literature in packages weighing 1 lb., as fourth class matter and not as parcel post. But custom house regulations and tax duties on these shipments caused him to give up the entire plan.

A 4-lb. package was assessed more than $5. As a result, the Department of Commerce has advised shippers that the best way to send catalogs and other literature to foreign countries is to ship them separately and obtain free admission, as single catalogs are not considered as a shipment in commercial quantities.

Catalogs and price lists sent singly are usually admitted free, excepting in South Africa, where they are free up to 8 oz. and cost 3 pence between 8 oz. and 16 oz., with an additional 1½ pence for each extra 8 oz. or fraction thereof. Advertising matter to Australia is dutiable at the rate of 10 pence per lb., or 40 per cent *ad valorem*, and the duty must be paid when the total quantity of advertising matter sent by one consignor in one mail to any one state in the commonwealth exceeds one shipping. The practice of the several countries in this regard is so varied that it is not possible to obtain a general statement which will serve as a guide, or, in fact, to obtain a complete list of the regulations of the countries of the world. Many countries have no specific provisions.

These problems are not being overlooked. The Departments of Commerce, Post Office and State are seeking to establish equitable rates and regulations, but the chief difficulties lie in the fact that in several countries, particularly in Latin America, there are no reciprocal conditions. That is, there are no inducements this country can offer for favors and no business threats which they might employ to bring about more reasonable parcel post arrangements.

The customs brokers in Argentina and Brazil are influential and have foiled every attempt to improve the regulations and, of course, reduce their fees. Furthermore, importers in some countries object to the development of parcel post service, foreseeing in it harmful competition to their own business.

In countries with which the United States now operates parcel post, parcels are allowed a maximum length of 3½ ft., length and girth combined of 6 ft., weight of 11 lb., except Ecuador, Mexico, Panama and Salvador, where the weight limit is 20 lb., and Brazil, Nicaragua, Peru, British Honduras, Columbia, Guatemala and the Republic of Honduras, where the weight is 22 lb. Parcels to China may weigh 11 lb., but must not exceed one cubic foot in volume.

The postage rate to all countries is 12 cents per pound or fraction thereof. Parcels to foreign countries cannot be sent insured or C. O. D., except to Mexico and Salvadore, where the sender of the registered parcel post package is entitled to an indemnity equal to the amount of actual loss incurred, but not exceeding 50 francs.

Parcel post relations, interrupted during the war, were resumed on the following dates:

Belgium	Jan. 27, 1919
Siam	Jan. 31, 1919
Greece	Feb. 3, 1919
Liberia	Feb. 12, 1919
Alsace and Lorraine	Feb. 20, 1919
Iceland	Feb. 21, 1919
Madeira Islands	March 11, 1919
Palestine and Mesopotamia	
Union of South Africa	April 12, 1919
Italy	April 16, 1919
Norway	April 19, 1919
Luxembourg	April 23, 1919
Paraguay	April 30, 1919
Algeria, Corsica and Tunis	April 30, 1919
Chile	May 14, 1919
Denmark, the Netherlands and Sweden	May 7, 1919
British India	May 12, 1919

It is up to the exporters to point out to the proper authorities the needs of the parcel post service to best serve the export business. While these negotiations are handled by the Departments of State, Commerce and Post Office, a letter to the Second Assistant Postmaster General will serve to notify these departments of the needs as viewed by the exporter.

Ethyl Alcohol from Waste Sulphite Liquor Using an Acclimated Yeast

RESULTS obtained from a series of investigations by the Forest Products Laboratory at Madison, Wis., upon the production of ethyl (grain) alcohol from sulphite pulp mill waste liquor are as follows:

Of the 2.0 to 2.9 per cent total sugars found in waste sulphite liquor about 55 to 62 per cent are fermentable and upon fermentation go to produce only ethyl alcohol.

Fermentations of the sulphite liquor conducted both on experimental and commercial scales showed a production of 0.7 to 1.15 per cent by volume of absolute alcohol. A plant with a capacity of 100,000 gal. of waste liquor would thus be able to produce 700 to 1150 gal. of absolute alcohol per day. Since the alcohol produced from this source contains a small quantity of methyl alcohol, but little further denaturing is necessary.

A comparison of yeasts showed that a yeast acclimated to sulphite liquor just prior to fermentation gave higher yields of alcohol than one which had been permanently acclimated to this liquor. The cost of the former process was enough greater, however, to discourage its use. This fact led the Laboratory to permanently acclimate a strain of beer yeast to this liquor and a culture was produced which gave results comparing very favorably with those obtained by the use of a freshly acclimated yeast.

A quite common custom of calculating alcohol yields from the sugar which disappears during a fermentation has been shown fallacious, since in some cases part of the sugar removed by fermentation forms substances other than alcohol.

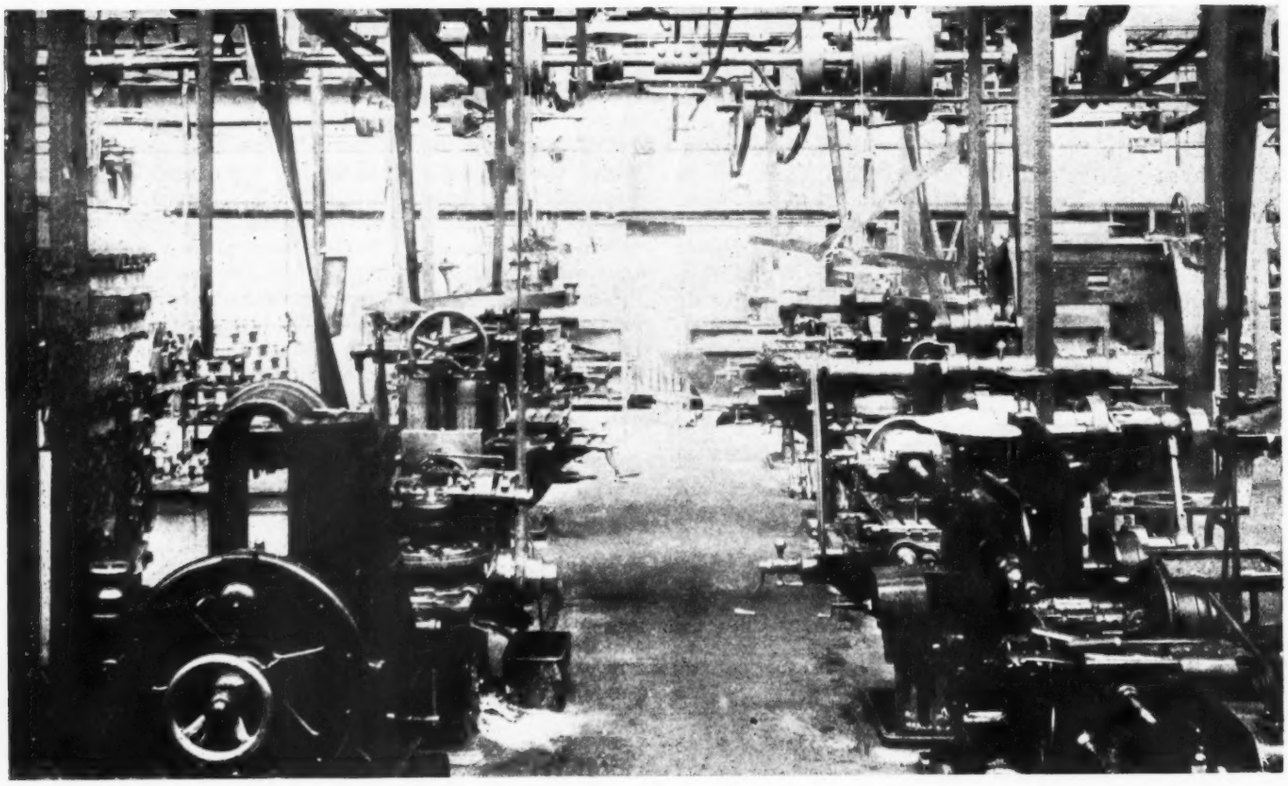
—

ACCORDING to an item in an English paper a steel works is to be established at Goderich, Ontario, to manufacture motor cars and parts, trucks and tractors. It is proposed to bring ore from Michigan and to manufacture high-carbon steel. The capital of the corporation is said to be £3,000,000.

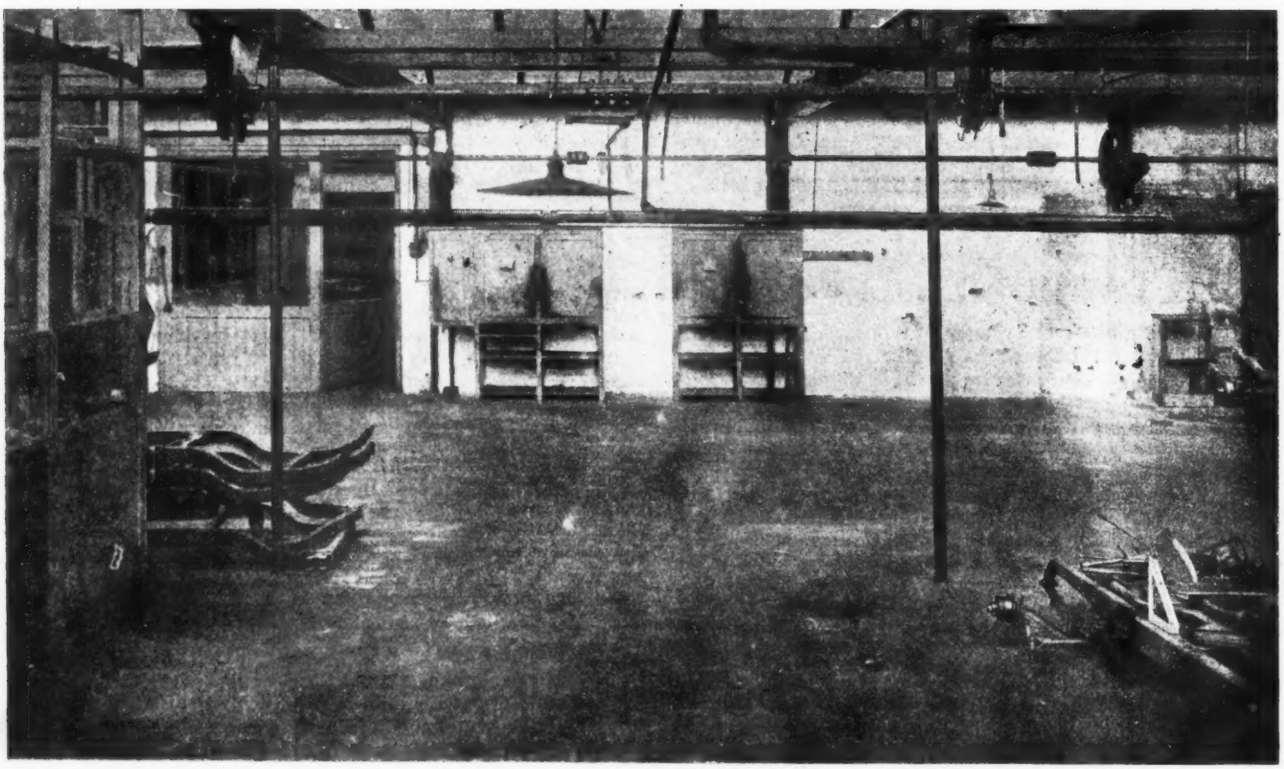
—

AN improved shim for babbitted bearings has been developed by the Laminated Shim Co. of New York. The shim is of the laminated type but has a babbitt edge, so that the entire bearing surface is of babbitt. The manufacturers of the shim say that undoubtedly a higher engine efficiency is obtained in this way.

Before and After the German Army

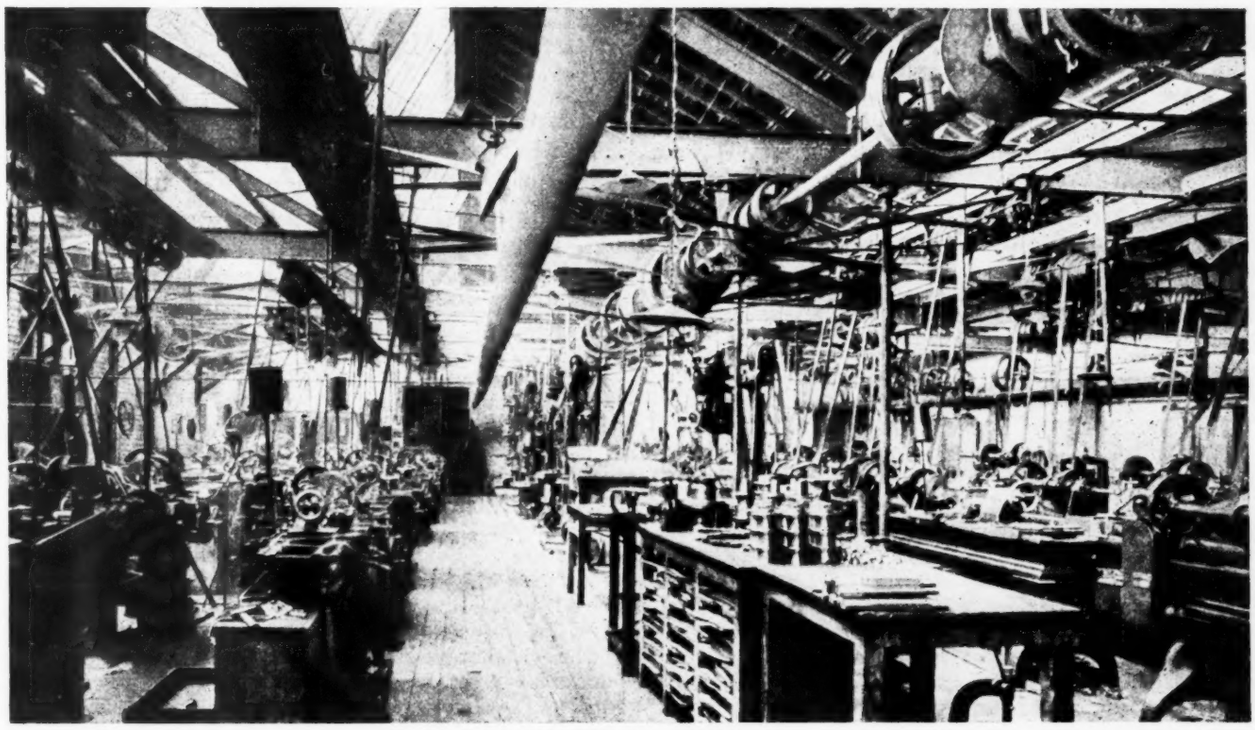


Gear cutting shop before the war

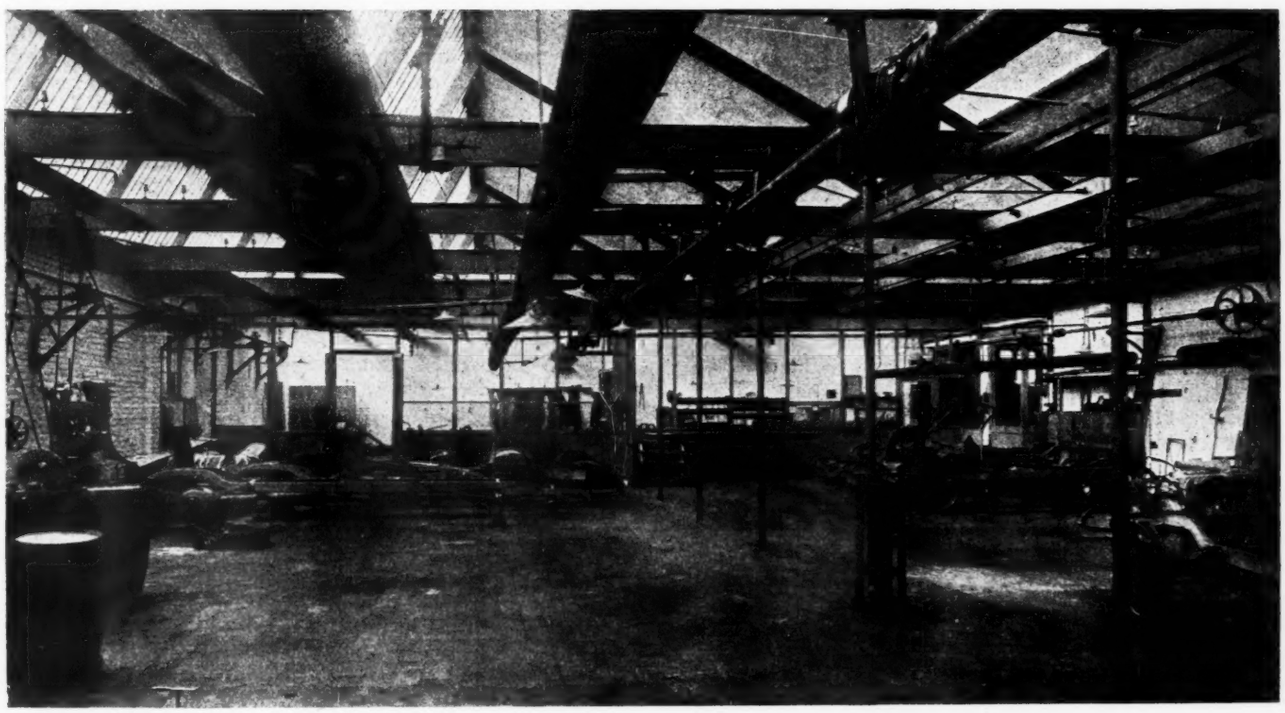


As the Germans left it

Raided the Excelsior Factory at Brussels



Main machine shop in August, 1914



Same shop on Armistice Day

Humanity and Tolerance Will Solve U. S. Labor Problems

DO you know what the recent strikes in this country mean? Have you grouped them as to cause? Do you know what steps have been taken to meet the changing conditions? Mr. Tipper has answered these questions. In this article he shows how this strike differed from that one. He shows how the radicals in labor circles have flourished through being opportunists and how they have seized, to promote their cause, strikes that were begun with an entirely different object. The following article is important to every American employer.
—EDITOR.

By Harry Tipper

IN reviewing the labor conditions and developments in the United States since the armistice, it is very important that care should be taken to distinguish between the labor unrest which has arisen out of the demands of the occupational unions affiliated with the American Federation of Labor, the unrest which has arisen out of the fight of the radical element in labor with the American Federation of Labor, the general unrest among the unskilled bodies which have been temporarily organized for some particular purpose, and the particular cases where the unrest which has occurred, through the efforts of the regularly organized unions, has been complicated by the action of the radical element after strikes had been started.

To some extent we are participating in the general spirit of unrest which follows the war as a necessary reaction from the war tension and strain. Not so much of this is due to actual strain, but a considerable part of it arises from the growth in Europe of this unrest and the suggestion which accompanies such knowledge, intelligently acted upon by the propagandists. The restrictions during the war in this country were not sufficiently severe to lead to any considerable strain and the conditions of the worker are so much better than they have been in Europe as to afford no basis of comparison in this respect.

Unemployment

The amount of unemployment is trifling in comparison with the statistics received from European countries, and the absorption of those turned out of the army and navy and from the war industries is proceeding with sufficient rapidity to indicate a lack of real surplus and a possible shortage of labor in the most important fields. There is a definite shortage of labor in a number of cities, and particularly in the automotive field.

This shortage extends into other industries where the turn-over from war production to peace necessities has not been severe and where skilled workers represent the majority of the required employees for productive purposes.

In general there is a considerable surplus of labor in various parts of the country. Although this surplus is a very small proportion of the total labor and cannot be regarded as a serious difficulty in the face of general business conditions in the United States, its position commands respect in view of world trade and the shortage of the usual immigration which has supplied a large portion of the unskilled labor in the past.

The surplus labor offers no such problem in this country as must be faced by Great Britain, and there is no reason for any alarm in respect of the totals of unemployed, particularly as from 60 to 90 per cent of those applying for jobs are placed with little difficulty.

The element of unorganized labor in this country, which is variously estimated at 5,000,000 to 7,000,000 workers, is the element which calls for the closest consideration in analyzing the question of industrial unrest. The I. W. W. organization, and similar radical bodies, claim a very large proportion of this unorganized labor as followers of their particular tenets.

There is no justification for this claim, but it is true that the I. W. W. propagandists and agitators find their greatest response from the unorganized portion of the laboring population who have no other means of voicing their grievances and have no experience with the regular machinery of the occupational union.

The total number of workers in this country who are affiliated with the American Federation of Labor is about 4,000,000 as a maximum. Before the war it was about 2,000,000. The attitude of the American Federation of Labor is conservative, and in comparison with the other organizations who are attempting to build their power on the unskilled workers, at present unorganized, their attitude is very safe and recognizes the necessity for slow development by compromise.

Labor Unrest

The reports of labor unrest in the public press as they appear from day to day make no distinction between the strikes or demands authorized by the occupational unions and those demands which have been created by the I. W. W. organization for the purpose of stimulating unrest, and those demands which have grown out of local grievances that are not recognized by the national labor leaders. The discussions in the more serious periodicals in respect of this question do not properly differentiate these various qualities of unrest and do not distinguish between the racial traditions which have some effect upon the actions taken.

With from 6 to 20 races involved in the working population of various industries, many of these races being

without any considerable knowledge of the language, the customs, the government or the political principles of the country, the possibilities of confusion in estimating the causes of industrial unrest are almost limitless.

This matter is emphasized because it has become apparent from the statements of executives of trade associations and manufacturers' bodies that the manufacturers themselves are in the dark as to the causes for much of the disturbance and are inclined to class all statements emanating from radical bodies as labor propaganda and are guilty of the mistake of confusing all unrest with the definite program of the American Federation of Labor. So long as there is no understanding of the various bodies who are engaged in promoting semi-political economic theories among the ranks of the workers of various nationalities and particularly attempting to organize those who are not organized into regular occupational unions, it will be futile to attempt to arrive at any plan which will form a basis for the solution of such difficulties.

The strikes which have occurred in this country and in Canada indicate the difference between the various demands and the difference in the origin of these strikes.

In the instance of the great sympathetic strike in Seattle, which caused such comment in this country and which was immediately defined as Bolshevism, I. W. W. and so forth, the actual history of the strike shows that it began by a demand of the workers in the government yard for an increase in pay. These workers are skilled mechanics and belong to the occupational unions. Their strike was not authorized by the unions nor approved by them but originated because of the grievance against the Emergency Fleet Corporation, which it was claimed had not kept faith with the strikers. On Feb. 7 various other union organizations went out in sympathy.

It appears from the history of this strike that the strike was originally backed by the local officials of the organized occupational unions affiliated with the American Federation of Labor, and that the control of the strike by the radical element was a later development and probably arose out of the success in bringing about sympathetic strikes and out of the prospect which was opened to the radical organization in the use of this machinery for their purpose.

The Textile Strike

The textile strike, which occurred in various centers, including Paterson, Passaic, Albany and Lawrence, Mass., was another illustration of a strike which was started by the regular occupational union and which was seized upon by the I. W. W. and other radical propagandists with the attempt to use it to their advantage and to prevent a settlement of the strike.

This strike originated with the demand of the United Textile Workers for an 8-hour day. In most parts of the country the demands were agreed to, but strikes occurred in Albany, Cohoes, Paterson, Passaic and Lawrence, Mass. In Lawrence the strike started out peacefully enough and was apparently close to a settlement when the I. W. W. and radical propagandists, who had poured into the city to foment the strike among the various nationalities, took advantage of the threatening attitude of the city officials and the mill men to organize the radical element into practical control.

This radical element succeeded in preventing a settlement of the strike for many days, by obliging the conferences to occur through them and adopting the irreconcilable attitude which is a part of their program.

The United Textile Workers branch of the American Federation of Labor not only expected a peaceful strike but withdrew its approval when the radical element succeeded in gaining control. Very few of the members who were on strike in Lawrence were members of the Textile Workers' Union, and most of them belonged to that large body of unorganized, semi-skilled and unskilled labor of various nationalities which can be swayed so easily by the promises of the more radical leaders who are interested in the extreme program of the I. W. W. This strike resulted in a general increase of wages of about 15 per cent and shortening of the hours of labor to 48 hours a week.

Another indication of the conflict which exists between the occupational unions and the I. W. W. and the importance of this conflict to the manufacturer is indicated by the copper miners' strike in Arizona, Montana and Utah. Notwithstanding the agreements of the regular occupational unions with the mine owners for conferences upon all wage questions and hours, the radical element, which claims adherence to the I. W. W., succeeded in engineering the strike and in the attempt to form a workers' government at Butte.

Other strikes which occurred on the wage question were those in the building trades, shoe trade, San Francisco shipyards, Brooklyn Rapid Transit workers, telegraphers and the expressmen and paper mill workers. Strikes which occurred in connection with hours of labor were very few, although the hours were mentioned in a good many of the strikes as a secondary and subsidiary matter.

Glass Workers' Strike

The glass workers in certain districts struck for a reduction from 12 to 8 hours. The expressmen's strike included an 8-hour day and various of the other strikes indicated that the workers were prepared to demand an 8-hour day.

One of the most important strikes which occurred in connection with the automotive field was the strike at the Willys-Overland plant in Toledo, which began on April 17 and which has not yet been settled completely. This strike assumed such great importance because it occurred in the face of the announcement of a profit sharing plan, upon which the first disbursement had just been made.

This strike was not engineered by the regular occupational unions, although a great many of the strikers were members of the unions. It was the result of the propaganda of the radicals in the labor organizations, of which Toledo has long been one of the centers of activity.

The number of alien workers in these automobile plants represents a considerable proportion of the total working population, and evidence has been accumulating for several years that it is among these alien workers the radical, semi-political, economic propagandists find their most fertile field for followers. This strike immediately took on the character of a radical socialistic movement and lost the sympathy of many of the union workers who were not in agreement with the radical program.

The strikes in Winnipeg and other sections of Canada, which are still in existence, have been advertised as Bolshevistic and I. W. W., but they are really a part of the Western Canadian unions which have been controlled by the radical element in labor circles for some years.

Many of the leaders of the Western occupational unions in Canada have come out flat-footedly in favor of one industrial union in each center, which is a part of the program of the I. W. W., and it was only by the efforts of the more conservative Eastern bodies that this program failed of adoption in the general convention of the Canadian Federated Unions.

The danger in this Canadian strike does not arise from the unorganized workers being seized by the alluring character of the radical program, but arises from the fact that the regular organizations have been controlled largely by the radical element, and this control has existed for a sufficient length of time to affect the whole policy of the local unions and their local affiliated organizations.

This disturbance, however, indicates that the idea of the industrial union and the radical program which has been a part of the policy of the Western unions in Canada has not developed such strength that it can control the whole of the labor organization. A number of unions withdrew from these strikes, and the best evidence indicates that at no time were the strikes so complete or so general as the daily reports in the newspapers would indicate.

Danger of Control by Radical Minority

At a time when there is a general unrest due to the reaction from the special strain, and also a fluidity of political opinion, there is always danger of the control of existing machinery by the radical minority temporarily, and a confusion in the minds of the outside public as to the extent of and reasons for that control.

The differences of opinion which existed in the labor ranks and the multiplicity of bodies which are attempting to deal with economic questions on the side of the worker can be illustrated in no better way than by examining the aims of labor as stated by various leaders and the resolutions adopted by various bodies. All political parties which are concerned with political propaganda under the general term of "socialism" include in their platforms economic demands, and the statements of these parties are frequently confused with the aims of occupational organizations. The general demands of occupational unions include:

1. **The 8-hour day.**
2. **The right of organization.**
3. **A tendency toward the increase of wages.**
4. **At all times an adequate wage in comparison with the cost of living.**

They also have some demands in connection with political questions, including the government ownership of public utilities and a change in the taxation methods. The various other bodies connected with labor, including the Socialist party, the I. W. W., the New York State Labor Party, fathered by the Central Federated Union of New York City, the Chicago Labor Party, and various other bodies of mixed origin, make demands running all the way from government ownership of utilities, representation in industry, 6-hour work day, the limitation of profit on invested capital, to the complete ownership of all means of production by the workers.

The American Federation of Labor to-day represents the largest general body of opinion in connection with labor conditions and similar economic questions existing among the workers in the United States. All the other bodies that claim to speak for labor and are concerned with semi-political and economic activities are so much less important, from the standpoint of their power in members and their agreement as to platform, that they should be examined and considered largely because of the value of their activities as an indication of the general tendency in certain sections of professional, semi-public and labor ranks to inject the economic developments into politics and provide a political platform of an economic character.

Any tendency for these other organizations to consolidate their aims and agree upon their demands would indicate a development of their organizations which would be of the greatest importance. So long as the number of organizations continues to multiply and the demands continue to disagree, they can be neglected for practical purposes and the situation in the labor field considered from the standpoint of the demands of the American Federation of Labor.

That these organizations become articulate and in some cases vociferous in their political propaganda, together with the evidence that most of them exist because of the complete lack of economic knowledge among a large section of the population, emphasizes the necessity for education of a better character than our present education among the workers; the importance of the right type of educators and necessity for the explanation of economic fundamentals in the curriculum.

They also emphasize the danger which exists to the industrial organizations of this country because of their neglect of all public matters, such as education, in the respective communities in which they are interested, and the important change which must take place in the business man's attitude upon all matters that he calls the politics of his community and state.

It is an unfortunate fact that most of the educators in our public secondary schools and even in our colleges have no practical working knowledge of industrial organization, its elements, its growth and its necessities, and are consequently unable to inform the students upon matters which will affect their mature lives more thoroughly than perhaps any other item.

The attitude of the employer in connection with labor questions is changing in this country, although we do not display the tolerance which is indicated by the attitude of the employers in Great Britain toward labor problems. At the same time, the developments which have occurred since the armistice was signed indicate the change which has taken place and the importance which is attached to that change by large industrial organizations. It is true that there are still a majority of manufacturers who believe the old system of organization can continue without any changes and adequately fill the bill, but many authorities in industry have indicated their vision of a change and indicated it in their utterances, not only, but in the practice in connection with their organizations.

Rockefeller's Principles

John D. Rockefeller, Jr., at the United States Chamber of Commerce Meeting, wound up a very illuminating address with a declaration of principles which is reproduced here:

1—I believe that Labor and Capital are partners, not enemies; that their interests are common interests, not opposed, and that neither can attain the fullest measure of prosperity at the expense of the other, but only in association with the other.

2—I believe that the community is an essential party to industry and that it should have adequate representation with the other parties.

3—I believe that the purpose of industry is quite as much to advance social well being as material well being and that in the pursuit of that purpose the interests of the community should be carefully considered, the well being of the employees as respects living and working conditions should be fully guarded, management should be adequately recognized and capital should be justly compensated, and that failure in any of these particulars means loss to all four.

4—I believe that every man is entitled to an oppor-

tunity to earn a living, to fair wages, to reasonable hours of work and proper working conditions; to a decent home, to the opportunity to play, to learn, to worship and to love, as well as to toil, and that the responsibility rests as heavily upon industry as upon government or society to see that these conditions and opportunities prevail.

5—I believe that industry, efficiency and initiative, wherever found, should be encouraged and adequately rewarded, and that indolence, indifference and restriction of production should be discontinued.

6—I believe that the provision of adequate means of uncovering grievances and promptly adjusting them is of fundamental importance to the successful conduct of industry.

7—I believe that the most potent measure in bringing about industrial harmony and prosperity is adequate representation of the parties in interest; that existing forms of representation should be carefully studied and availed of insofar as they may be found to have merit and are adaptable to the peculiar conditions in the various industries.

8—I believe that the most effective structure of representation is that which is built from the bottom up, which includes all employees, and, starting with the election of representatives in each industrial plant, the formation of joint works committees, of joint district councils, the annual joint conferences of all the parties in interest in a single industrial corporation, can be extended to include all plants in the same industry, all industries in a community, in a nation and in the various nations.

9—I believe that the application of right principles never fails to effect right relations; that the letter killeth and the spirit maketh alive; that forms are wholly secondary, while attitude and spirit are all important, and that only as the parties in industry are animated by the spirit of fair play, justice to all and brotherhood will any plans which they may mutually work out succeed.

10—I believe that that man renders the greatest social service who so co-operates in the organization of industry as to afford to the largest number of men the greatest opportunity for self-development and the enjoyment by every man of those benefits which his own work adds to the wealth of civilization.

This is reproduced not only because of its general declaration of principles but because the Standard Oil Co. of New Jersey, Colorado Fuel & Iron Co., Standard Oil Co. of New York, the Gilbert & Barker Co. and other companies in which Mr. Rockefeller is interested have been operating through joint councils and profit sharing developments for a year, indicating that the declaration has been capable also of a practical application in these industrial organizations.

A number of joint councils in one form or another have been adopted by the Bethlehem Steel Co., Midvale Steel Co., Lukens Steel Co., International Harvester Co., Goodyear Tire & Rubber Co., Doehler Die Casting Co., Packard Piano Co., Van Sicklen Speedometer Co. and a number of others, and this development has been growing since the armistice, so that it is unusual for a few days to pass without the record of additional business institutions who are operating under this system in one of its various forms.

Notwithstanding these facts, there is a considerable body of opinion among the manufacturers who believe that the old method of warfare between the union and the employer must go on and are not prepared to make any concessions or to consider any changes in organization. This is indicated by the suggestions made at the National Association of Manufacturers at its convention:

1—Fair dealing as the fundamental and basic principle.

2—No opposition to labor organizations — but against illegal acts of interference with the personal liberty of other employees (the open shop).

3—No discrimination regarding employment because of membership in labor organizations, but also no discrimination by employees against fellow employees who are not members of labor organizations (the open shop).

4—Right of employee to leave his employment whenever he sees fit, and equal right of the employer to discharge.

5—Freedom to adjust wages between employer and employee without interference or dictation on the part of individuals or organizations outside of the industrial enterprise concerned.

6—Freedom of employees against molestation or interference in their business and in the methods they choose to adopt or systems of pay, provided same are just and equitable.

7—No limitation upon opportunities for any person to learn any trade. (Restrictions as to apprenticeship.)

8—No strikes and lockouts, but amicable adjustment through methods that will preserve the rights of both parties.

9—Acknowledgment of the right of employees to contract for services through collective bargaining, but repudiation of stipulations that employment should be denied to men not parties to such contracts. (In other words, this is a declaration against the closed shop.)

10—A pledge of National Association of Manufacturers to oppose any and all legislation not in accord with the foregoing declarations.

However, when leaders like Frank Shove, president of the National Association of Cotton Manufacturers; Frank A. Vanderlip, banker; John N. Willys, president of the Willys-Overland Co.; Eugene M. Grace, president of the Bethlehem Steel Corp., and many more who can be quoted, admit that the worker should have some say in the government of his own conditions of work and that there should be tolerance and amicable possibilities of adjustment, the situation has developed sufficiently to merit the hope that the United States can offer a basis for the solution of its problem, which will be more advantageous in its permanent effects than the solutions which must be considered by the European countries where the conditions are entirely different.

There has been a general desire in this country to keep the labor question out of the political arena, a desire which is voiced by the president of the American Federation of Labor just as definitely as it is voiced by the manufacturer. The war made it necessary for the government to interfere in the labor situation to a considerable degree, and there is evidence that economic questions will inevitably become political questions by the very necessity for industrial peace and the recognition of the widespread demand for change in conditions.

Interference of government in the conduct of industry in respect of the hours, wages and working conditions is always to be deprecated unless the impossibility of decent agreement makes it necessary from the public standpoint. For many years the government in this country has been obliged to formulate regulations limiting the number of hours which can be worked in certain industries because of the character of these industries or

the character of the labor. It has been obliged to regulate on questions of employers' liability and similar matters, on questions of factory space per man, lighting, sanitation and other matters which concern the public health.

The Government and Industry

In its general regulation of industry from the workers' standpoint, the government, in this country, has done less than any other country. There is no general sentiment as yet for the limitation of child labor and there are many states in which there is no such regulation at this time. The sanitary regulations vary from state to state and the public necessities have not yet forced any general agreement upon the fundamental living conditions in connection with industrial work.

The difficulty of government action in connection with industrial necessity arises from the fact that standard regulation imposes as much hardship as it prevents. Taking no account of the local conditions involved, of the particular character of the work, and of the particular character of the individual organization, it cannot modify its regulations to take advantage or correct these local differences.

For this reason the smallest amount of government regulation consistent with the public welfare is the best position industrially. Notwithstanding these facts, there is a persistent demand for government action in connection with industrial matters—a demand frequently favored by the public, which has become tired of being subjected to the inconveniences arising out of the continual warfare between employers and employees and their almost total neglect of the public necessities when their own demands are at stake.

Political action upon labor matters and their economic necessities is being demanded more than ever, and the government at Washington is more sensitive to the labor development than at any other time.

Regulation of Troubles

All through the political body, with its preponderance of lawyers, there exists the idea that regulation is the general panacea for all troubles, and just as soon as we get a few bomb outrages we must immediately enact a sheaf of new laws, even though the old ones are perfectly good if they were properly enforced and operated. The number of new laws put into effect in each State reach a surprising total when they are collected, and the constant demand for regulations of this kind indicates that a large body of public opinion believes that regulation is the best way to bring about the result.

Under these circumstances it is obvious that the amount of regulation that will be put into effect depends largely upon the attitude of the manufacturer. If he will divest himself from the idea that he has *no obligation to the public*, if he will throw away his prejudices and analyze the conditions, he will appreciate that, whether he agrees with the situation or not, the tendency of the times *demands that he discuss the workers' problems with them*, that he accede to the right of the public to criticize and investigate his method of doing business and that the law of supply and demand is not a principle governing the human beings, and that the health of the body politic is more important to that body than the success of his individual enterprise.

Inasmuch as the worker, either brain or hand worker, constitutes a large majority of the voting population and his opinions and ideas are astonishingly different from those of the majority of manufacturers, it is not difficult to conceive of the present tendency toward governmental regulation continuing and enlarging its scope, unless the manufacturers realize that political power can be used to secure industrial power, just as industrial power was used in the past to secure political power.

There is no escape in Great Britain from the political decision upon labor matters because the issue has been drawn for so long, and the warfare continued so intensively, that one of the largest political bodies has been created for the purpose of enforcing economic demands, and it is not unlikely that the labor party in Great Britain may be called upon to supply the cabinet for the British Empire at the next election. There is a possibility in this country of providing a basis for the solution of the labor problem without bringing it squarely into the political arena and making the solution more difficult by that fact.

The first steps toward this solution have been taken. There is a better understanding between labor and capital, or rather between employer and employee. There is a better disposition on both sides and practical men have devised practical means of providing machinery for the solution of many of these questions. A continuance of the tendency in this direction will open up the possibility of the settlement of these matters without the necessity for a great deal of governmental intervention, and a settlement of them along what would seem to be a most orderly line. The unrest is not serious, the radical element is not unduly large, but the demand for a better understanding is widespread and the recognition that industrial organization as it was has not fulfilled its obligations to society is equally widespread. A review of the six months gives hope that industry is cognizant of the situation and operating to meet it.

Swedox Rod and Wire Filler for Welding

COINCIDENT with the development of the newer welding processes, there has been great improvement and specialization in the materials used. The Central Steel & Wire Co. of Chicago is manufacturing eight varieties of "filler," each adapted for a particular kind of ferrous metal.

Only seven years ago comparatively little autogenous welding was being done, and the attention of the officials of the Central Steel & Wire Co. was first directed to the subject when a manufacturer of steel barrels became one of their steady customers, buying an unusual amount of welding wire. The metallurgists of the company were instructed to investigate the subject of welding as a whole.

As a result of their preliminary investigation, they proposed the adoption of the present form of rods and wires. This was an important step, but what is regarded as a vastly more important step was the adoption of special treatments of welding wires for electric welding and acetylene welding, respectively.

As the investigation was carried farther, it was found that better results could be obtained by using slightly different fillers for different grades of steel to be welded. This development finally led to the adoption of eight distinct fillers which are now being offered by the company. These eight fillers are as follows:

Mannox, for acetylene welding; Lektrox, for electric welding; Castox, for cast iron; Carbox, for cast steel; Vanox, for vanadium metal; Nickox, for nickel welding; Kromox, for chrome nickel, and Railox, for use in welding railroad tracks, switches, rods, etc. All are known by the family name of Swedox.

Air Weight and Volume Measurement

PART II

Theory of the Venturi Meter as Applied to Liquids and as Applied to Gases

By Don T. Hastings

THE theory of the venturi meter is based on natural laws whose accuracy has been many times proven by the most competent investigators. Careful tests also of well-made venturi meters have repeatedly shown results well within 1 per cent of the theoretical.

Theory for Liquids

The theory of the venturi meter used to measure liquids is as follows: Liquids are practically incompressible; consequently, if the flow through the venturi meter is steady, equal volumes of the liquid must pass through all sections of the meter in a given length of time. The volume passing any section per second is equal to the area of the section multiplied by the velocity of flow. Expressing this in symbols, let

A = area in square feet of large section venturi
a = area in square feet of throat
Q = volume in cubic feet passing any section per second
V = velocity in feet per second through large section of venturi
v = velocity in feet per second through throat

Then $Q = AV = av$.

The quantities V and v are related according to the formula

$$\frac{V^2}{2g} + \frac{P}{W} + H = \frac{v^2}{2g} + \frac{p}{W}$$

in which friction in the meter is neglected and

g = acceleration of gravity = 32.16 ft. per sec. per sec.
P = absolute pressure in the pipe in pounds per sq. in. at large section
p = absolute pressure at throat
W = weight of liquid per cubic foot in pounds
H = distance of large section of meter above (or below) throat in feet

When the axis of the meter is horizontal, as is usually the case, $H = O$ and

$$\frac{V^2}{2g}\,\frac{W}{P} = \frac{V^2}{2g} + \frac{p}{W}$$

The formulae (2) and (3) are based fundamentally on the principle of the conservation of energy. The quantity $\frac{V^2}{2g}$ is the so-called "velocity head" and represents the height required to produce the velocity v of a body starting from rest under the influence of the acceleration of gravity g. $\frac{P}{W}$ is the "pressure head" and represents the height of a column of the liquid required to produce the pressure exerted on the liquid. It is thus seen that all the quantities in formulae (2) and (3) represent heights or "heads." The derivation of the formula can be found in any standard reference work on Hydraulics if desired.

From (1)

$$V^2 = v^2 \times \frac{a^2}{A^2}$$

and substituting in (3)

and transposing

$$\frac{v^2}{2g} - \left(\frac{v^2}{2g} \times \frac{a^2}{A^2}\right) = \frac{P}{W} - \frac{p}{W} \qquad (4)$$

$$\frac{v^2}{2g}\left(1 - \frac{a^2}{A^2}\right) = \frac{P-p}{W} \qquad (5)$$

$$v^2 = \frac{2g}{\left(1 - \frac{a^2}{A^2}\right)} \times \frac{P-p}{W} = \frac{1}{1 - \frac{a^2}{A^2}} \times 2g \times \frac{P-p}{W} \qquad (6)$$

$$v = \sqrt{\frac{1}{1 - \left(\frac{a^2}{A}\right)}} \times \sqrt{2g\,\frac{P-p}{W}} \qquad (7)$$

Substituting the value of v as computed from equation (7) in equation (1) gives the quantity.

Theory for Gases

The formulae derived above for liquids flowing through a venturi meter are applicable to gases, because gases are compressible and consequently the density of the gas varies with changes in pressure and temperature. The result is that equal *volumes* do not pass the various sections of the venturi in the same length of time. If the flow is steady, however, equal *weights* of the gas must pass all sections in equal time intervals and on this basis formulae may be derived. In the following, friction losses will be disregarded, as they have been proven entirely negligible; the discussion also is limited to venturi tubes whose axes are horizontal, thus eliminating the factor due to the difference in height or the "static head." In practice it is always possible and usually by far most convenient to set the venturi tubes in this position.

Departing for a moment from the venturi meter, consider a piston moving in a cylinder as a result of the pressure exerted on it by the gas filling the cylinder. Assume that this pressure is maintained constant as the piston moves. The work done on the piston, neglecting friction and temperature effects, is measured by the force exerted, multiplied by the distance the piston is moved, or

Work = Force $\times$ Distance
Force = Gas Pressure $\times$ Area of Piston
and Work = Pressure $\times$ Area $\times$ Distance

The area multiplied by the distance equals the volume displaced by the gas during the time the work was done, so the expression may be written

Work = Pressure × Volume
or $W = P \times V$

If the pressure does not remain uniform but varies during the movement, as is usually the case, the same formula can be applied by subdividing the distance into as many parts as may be necessary, so that the pressure during any one part of the travel is practically constant, multiplying the pressure during each part of the travel by its corresponding small volume and adding the results together, as

$$W = P_1V_1 + P_2V_2 + P_3V_3 + \ldots\ldots\ldots + P_nV_n$$

This expression shows that the work done is the sum of such terms as $P\ V$; when V is made very small to get accurate results it is usually written "dV." The formula is then written

$$W = \int_{V_1}^{V_2} P\ dV$$

In words this means that W is equal to the sum of such terms as $P\ dV$ between the limits V_1 and V_2, V_1 and V_2 being the volumes at the beginning and end of the working period.

This formula can be evaluated graphically for any particular case, as, for example, that of a steam engine indicator diagram. Whent here is a known algebraic relation between the various pressures and their corresponding volumes, the solution can be found mathematically.

Consider now a straight tube of uniform diameter through which gas is flowing steadily. Imagine that the gas is divided into discs or layers at right angles to the axis of the pipe. Each disc will press on the layer in front of it and in turn be pressed on by the layer behind it. Any disc or layer may then be compared to the piston in its cylinder, with reference to the gas immediately behind it.

If the diameter of the pipe is not uniform, but contracted, as in a venturi tube, the analogy still holds, though in this case the pressure and volume are both changing. The formula still holds, however, and we may write as the fundamental equation of the venturi tube

$$W = \int_{V_1}^{V_2} P\ dV \qquad (9)$$

The next step is to determine the algebraic relation between P and V so that the formula can be put into usable shape.

Countless experiments by numerous scientists have proven that for all gases, including air, this relation is given by the general formula

$$P\ V^s = P_1\ V_1^s = P_2 V_2^s = K$$

in which

$P\ P_1\ P_2$ = absolute pressures
$V\ V_1\ V_2$ = volumes
s = an exponent usually greater than 1 and less than 1.5
K = a constant

The values of s and K have been most carefully determined for air and many other gases under various conditions, and may be found in any standard work on Thermo-Dynamics. The particular values for use in the case of air measurement by means of the venturi meter will be given later.

From equation (9)

$$P = \frac{K}{V^s} \qquad (10)$$

Substituting in equation (8)

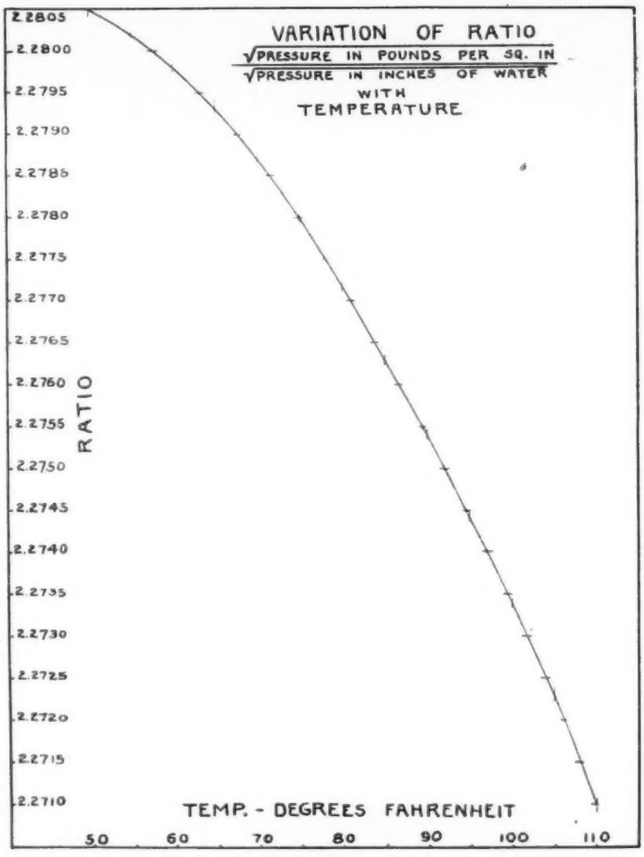


Fig. 11

$$W = \int_{V_1}^{V_2} \frac{K}{V^s}\ dV \qquad (11)$$

As K is a constant it may be moved outside the summation sign, and we get

$$W = K \int_{V_1}^{V_2} \frac{dV}{V^s} \qquad (12)$$

The mathematical process of integration is now applied and we get

$$W = K \int_{V_1}^{V_2} \frac{dV}{V^s} = K \int_{V_1}^{V_2} V^{-s} dV$$

$$= \frac{K}{1-s} [V_2^{1-s} - V_1^{1-s}] \qquad (13)$$

As s is greater than 1 as stated above the denominator and both exponents are negative; changing form to get positive values, we have

$$W = \frac{K}{s-1} \left[\frac{1}{V_1^{s-1}} - \frac{1}{V_2^{s-1}} \right] \qquad (14)$$

To get the equation in more convenient form multiply and divide by the factor $\frac{1}{V_2^{s-1}}$ or $\frac{1}{V_1^{s-1}}$

$$W = \frac{K}{s-1} \times \frac{1}{V_2^{s-1}} \left[\frac{V_2^{s-1}}{V_1^{s-1}} - 1 \right] \qquad (15a)$$

$$\text{or } W = \frac{K}{s-1} \times \frac{1}{V_1^{s-1}} \left[1 - \frac{V_1^{s-1}}{V_2^{s-1}} \right] \qquad (15b)$$

Substituting the values of K from (9) we get

$$W = \frac{1}{s-1} \times \frac{P_2 V_2^s}{V_2^{s-1}}\left[\left(\frac{V_2}{V_1}\right)^{s-1} - 1\right] \quad (16a)$$

$$W = \frac{1}{s-1} \times \frac{P_1 V_1^s}{V_1^{s-1}}\left[1 - \left(\frac{V_1}{V_2}\right)^{s-1}\right] \quad (16b)$$

Cancelling

$$W = \frac{P_2 V_2}{s-1}\left[\left(\frac{V_2}{V_1}\right)^{s-1} - 1\right] \quad (17a)$$

$$W = \frac{P_1 V_1}{s-1}\left[1 - \left(\frac{V_1}{V_2}\right)^{s-1}\right] \quad (17b)$$

Again from equation (9) we get

$$\frac{P_2}{P_1} = \left(\frac{V_1}{V_2}\right)^s \quad \text{and} \quad \frac{P_1}{P_2} = \left(\frac{V_2}{V_1}\right)^s \quad (18)$$

Extracting the S root we get

$$\frac{P_2^{\frac{1}{s}}}{P_1} = \frac{V_1}{V_2} \quad \text{and} \quad \left(\frac{P_1}{P_2}\right)^{\frac{1}{s}} = \frac{V_2}{V_1} \quad (19)$$

Raising to the $s - 1$ power

$$\left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}} = \left(\frac{V_1}{V_2}\right)^{s-1} \quad \text{and} \quad \left(\frac{P_1}{P_2}\right)^{\frac{s-1}{s}} = \left(\frac{V_2}{V_1}\right)^{s-1} \quad (20)$$

Substituting these values in (17a) and (17b)

$$W = \frac{P_2 V_2}{s-1}\left[\left(\frac{P_1}{P_2}\right)^{\frac{s-1}{s}} - 1\right] \quad (21a)$$

$$W = \frac{P_1 V_1}{s-1}\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] \quad (21b)$$

Either of these equations (21a) and (21b) represents the work done during the expansion of the gas, that is, during its change from the P_1, V_1 condition to the P_2, V_2 condition. To get the total work done, however, we must add to this expression the work done at the constant initial pressure in replacing the gas which has been expanded and must subtract the work done at the constant final pressure in displacing the volume of gas necessary to permit the flow to take place. This gives us, using only equation (21b) for convenience

$$W = P_1 V_1 + \frac{P_1 V_1}{s-1}\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] - P_2 V_2 \quad (22)$$

Referring again to (9) we may write

$$P_1 V_1 V_1^{s-1} = P_2 V_2 V_2^{s-1} \quad (23)$$

and

$$P_2 V_2 = P_1 V_1 \left(\frac{V_1}{V_2}\right)^{s-1} \quad (24)$$

Substituting from (20)

$$P_2 V_2 = P_1 V_1 \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}} \quad (25)$$

Substituting in (22)

$$W = P_1 V_1 + \frac{P_1 V_1}{s-1}\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] - P_1 V_1 \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}} \quad (26)$$

$$W = P_1 V_1\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] + \frac{P_1 V_1}{s-1}\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] \quad (27)$$

$$W = P_1 V_1\left[1 + \frac{1}{s-1}\right]\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] \quad (28)$$

$$W = \frac{s}{s-1} P_1 V_1 \left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] \quad (29)$$

Equation (29) represents the total work done on the gas during its change of condition; it consequently is equal to the difference in energy possessed by the gas before and after the change. The initial energy is given by the expression

$$E_1 = \tfrac{1}{2} m u_1^2$$

and the final energy by

$$E_2 = \tfrac{1}{2} m u_2^2$$

m = the mass of the gas
u_1 = velocity at large upstream section of the venturi tube
u_2 = velocity at throat of venturi

Subtracting,

$$W = E_2 - E_1 = \tfrac{1}{2} m (u_2^2 - u_1^2) \quad (30)$$

Substitute for m its equivalent $\frac{w}{g}$

w being the weight of the gas in pounds and g being the acceleration due to gravity = 32.159 ft. per second.²

$$W = \frac{w}{2g}(u_2^2 - u_1^2) \quad (31)$$

If w is taken as 1 pound and u_1 and u_2 are measured in feet per second, we may combine equations (29) and (31)

$$W = \frac{1}{2g}(u_2^2 - u_1^2) = \frac{s}{s-1} P_1 V_1 \left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] \quad (32)$$

Since we have taken $W = 1$ pound V_1 becomes the volume of 1 pound of the gas at the pressure P_1 and consequently $\frac{1}{V_1}$ = the density d_1 at that pressure, from which,

$$V_1 = \frac{1}{d_1} \quad (33)$$

Substituting in (32) we have

$$u_2^2 - u_1^2 = 2g \frac{s}{s-1} \frac{P_1}{d_1}\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] \quad (34)$$

As equal weights pass both upstream and throat sections in equal time intervals, the velocities, densities and areas must be related as follows:

$$w = w_1 = w_2 = A_1 u_1 d_1 = A_2 u_2 d_2 \quad (35)$$

But

$$\frac{d_2}{d_1} = \frac{V_1}{V_2} \quad \text{from (33)}$$

and

$$\frac{V_1}{V_2} = \left(\frac{P_2}{P_1}\right)^{\frac{1}{s}} \quad \text{from (19)}$$

$$\text{so} \quad d_2 = d_1 \left(\frac{P_2}{P_1}\right)^{\frac{1}{s}} \quad (36)$$

Substituting in (35) and dividing out d_1,

$$u_1 = \frac{A_2}{A_1} u_2 \left(\frac{P_2}{P_1}\right)^{\frac{1}{s}} \quad (37)$$

Squaring this value of u_1 and substituting in equation (34)

$$u_2^2 - \left(\frac{A_2}{A_1}\right)^2 u_2^2 \left(\frac{P_2}{P_1}\right)^{\frac{2}{s}} =$$

$$2g \frac{s}{s-1} \frac{P_1}{d_1}\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] \qquad (38)$$

$$u_2^2\left[1 - \left(\frac{A_2}{A_1}\right)^2 \left(\frac{P_2}{P_1}\right)^{\frac{2}{s}}\right] =$$

$$2g \frac{s}{s-1} \frac{P_1}{d_1}\left[1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}\right] \qquad (39)$$

$$u_2 = \sqrt{2g \frac{s}{s-1} \frac{P_1}{d_1}\left[\frac{1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}}{1 - \left(\frac{A_2}{A_1}\right)^2 \left(\frac{P_2}{P_1}\right)^{\frac{2}{s}}}\right]} \qquad (40)$$

Substituting this value of u_2 and the value of d_2 from (36) in (35)

$$w\left(\begin{matrix}\text{pounds}\\ \text{per second}\end{matrix}\right) =$$

$$A_2 d_1 \left(\frac{P_2}{P_1}\right)^{\frac{1}{s}} \sqrt{2g \frac{s}{s-1} \frac{P_1}{d_1}\left[\frac{1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}}{1 - \left(\frac{A_2}{A_1}\right)^2 \left(\frac{P_2}{P_1}\right)^{\frac{2}{s}}}\right]}$$

from which

$$w = A_2 \left(\frac{P_2}{P_1}\right)^{\frac{1}{s}} \sqrt{2g \frac{s}{s-1} P_1 d_1 \left[\frac{1 - \left(\frac{P_2}{P_1}\right)^{\frac{s-1}{s}}}{1 - \left(\frac{A_2}{A_1}\right)^2 \left(\frac{P_2}{P_1}\right)^{\frac{2}{s}}}\right]} \qquad (41)$$

In this formula the various quantities must be measured in the proper units; they are consequently recapitulated below for convenience:

- w = weight of air flowing in pounds per second
- A_2 = area of throat of Venturi tube in square feet
- P_1 = pressure in upstream part of Venturi tube in pounds per square foot absolute.
- P_2 = pressure in throat in pounds per square foot absolute
- g = acceleration of gravity = 32.159 ft. per second'
- s = an exponent whose value in this case is 1.4023—this is the value which has been determined for air when its expansion is adiabatic; that is, when no heat is given up by the air to the walls of its containing vessel nor any received by the air from the walls. This is assumed to be the case in flow through Venturi tubes due to the high velocities employed and seems to be justified, as many extremely careful tests have been made to check the instrument with results of errors of less than 1 per cent in all cases
- d_1 = density in pounds per cubic foot of air in upstream section of Venturi tube—the determination of this factor will be discussed later
- A_1 = area of upstream section of Venturi tube in square feet

Substitution of the numerical values of g and s simplifies formula (41) somewhat

$$w = A_2 \left(\frac{P_2}{P_1}\right)^{0.71286} \sqrt{64.318 \times 3.48262\ P_1\ d_1} \times \sqrt{\frac{1 - \left(\frac{P_2}{P_1}\right)^{0.28714}}{1 - \left(\frac{A_2}{A_1}\right)^2 \left(\frac{P_2}{P_1}\right)^{1.42572}}} \qquad (42)$$

Extracting the numerical root and squaring $\left(\frac{P_2}{P_1}\right)^{0.71286}$ in order to place it under the radical sign

$$w = \frac{14.96647}{A_2 \sqrt{P_1}\sqrt{d_1}} \sqrt{\times \frac{\left(\frac{P_2}{P_1}\right)^{1.42572}\left[1 - \left(\frac{P_2}{P_1}\right)^{0.28714}\right]}{\left[1 - \left(\frac{A_2}{A_1}\right)^2 \left(\frac{P_2}{P_1}\right)^{1.42572}\right]}} \qquad (43)$$

It will be more convenient to read the weight as pounds per minute instead of per second, so we multiply by 60. It is also desirable to express the area in square inches instead of square feet, so we divide by 144.

$$w \text{ (lb. p. m.)} = 6.23603\ A_2 \text{ (sq. in.)} \sqrt{P_1}\sqrt{d_1}\sqrt{\quad} \qquad (44)$$

For convenience in reading pressures, water manometers will be used. The readings of a water manometer will vary with the temperature; at 78 deg. F. a 1-in. column of water represents a pressure per square foot of 5.1875 lb. At 50 deg. F. this value is 5.2075 lb., and at 110 deg. F. 5.1575 lb. As we are concerned only with the square roots of these quantities, we get the following relations:

At 50 deg. F., 2.2805
At 78 deg. F., 2.2776
At 110 deg. F., 2.2710

The values of this conversion factor are shown in Fig. 11; between the limits given, which are the extremes usually met in practice, the variation either way from the value corresponding to 78 deg. F. is less than 0.3 per cent. This variation may be taken into account when extreme accuracy is desired, but for all ordinary purposes we may use the factor 2.2776. The temperature of 78 deg. F. is chosen as this is about the average temperature encountered in ordinary work.

Introducing this factor (by multiplication) and reading P_1, in inches of water absolute, the formula becomes

$$w = 14.203\ A_2 \sqrt{P_1}\sqrt{d_1} \frac{\sqrt{\left(\frac{P_2}{P_1}\right)^{1.42572} \times \left[1 - \left(\frac{P_2}{P_1}\right)^{.28714}\right]}}{\sqrt{1 - \left(\frac{A_2}{A_1}\right)^2 \left(\frac{P_2}{P_1}\right)^{1.42572}}} \qquad (45)$$

in which

- w = pounds per minute
- A_2 = area in square inches of throat
- P_1 = pressure in inches of water absolute
- d_1 = density in pounds per cubic foot of dry air at pressure P_1
- $\frac{P_2}{P_1}$ = ratio of absolute pressures at throat and upstream. This ratio must be kept between the limits .950 and .995 to secure the best results.
- $\frac{A_2}{A_1}$ = ratio of *areas* of throat and upstream section. This ratio should be ¼ to 1/16.

The FORUM

Status of Lorraine-Dietrich Aircraft Engine When Examined by U. S. Engineers

By M. Barbarou

AS a member of the Society of Automotive Engineers and Technical Director of the Lorraine-Dietrich Co. (Route de Bezons, Argenteuil, France), I take the liberty of drawing your attention to a paragraph of an article by J. G. Vincent headed "Lorraine-Dietrich Held Up as a Model," which appeared in your magazine dated February 6. This article contains inaccuracies, and I shall feel much obliged if you will kindly correct same. I wish to most emphatically contradict the statement that the "Lorraine-Dietrich" eight-cylinder motor was in the "experimental state" when the officers delegated by the United States Government came to examine it.

I am glad to learn that the engineers who came to examine the Lorraine engine were Captain Clark and Capt. Howard Marmon, for they never introduced themselves to any of the managers of the firm, which latter had given instructions that all persons delegated by the United States Government should have free access to all parts of the works.

These officers came to see the Lorraine-Dietrich Co. in July and August, 1917, and this type of engine, perfectly tuned up for quantity production, underwent a successful official test of 50 hr. Dec. 26-30, 1916, as you will see by the detailed test performance I am enclosing herewith, certified correct by the inspection officer of the Lorraine-Dietrich Works. The details of this engine were quite settled for manufacturing in series.

I must add that the Lorraine-Dietrich Co. made a series of high altitude tests (Lautaret pass) with this engine, beginning July 30, 1917. I consider that it is stretching the truth when the author says in the article that the Lorraine-Dietrich engine was in the "experimental state" and that this applied more to the Liberty engine.

The Lorraine-Dietrich Co. received numerous calls from different United States officers for the supply of inlet manifolds and carbureter parts to improve the carburetion of the engine. I proposed to tune up the engine (carburetion, etc.).

I am sending you in this connection photographs and a translation of a letter sent by the French War Office to the Lorraine-Dietrich Co. on July 6, 1918, and a confirmation of a telephonic message sent by the French Technical Section for Aviation on June 19, 1918. You will notice from these documents that the Lorraine-Dietrich Co. offered the United States Government a free manufacturing license for its aviation engines.

With regard to the 370-hp. twelve-cylinder engine, the Lorraine-Dietrich Co. was asked for a sample engine toward the end of 1918, and I refused to have it delivered, not seeing the necessity of supplying a model in view of the manufacture of the Liberty engine.

I shall feel obliged if you will kindly publish this letter in your magazine, so that your readers may know that when the United States Government sent a delegation of engineers to France to study the Lorraine motors, this company had several types which were absolutely ready, from every point of view, for quantity production.—M. BARBAROU, *Technical Director, Lorraine-Dietrich Co.*

Letter of the Director of Military Aviation (France) to the Administrator of the Lorraine-Dietrich Co.

(*Translation*)

DEAR SIR: I have the honor to inform you that the Aircraft Manufacturing Department has received the necessary instructions to deliver to your works as soon as possible, in agreement with the Aviation Technical Department, a Liberty engine, in order that your specialists may try to improve its carburetion.

In your letter of June 17, you also offered to the French Government, for the American Aviation, a free manufacturing license for your 500 hp. and 1000 hp. motors.

I beg to express my best thanks for this suggestion, as also for the first one, and wish to congratulate you for having so thoroughly and with so broad minded a spirit understood the role of collaboration which firms such as yours cannot fail to play with regard to our American allies.

I am advising of your offer General Patrick, Director of the American Aviation Expeditionary Force, 45 Avenue Montaigne.

Yours faithfully,

(Signed) PAUL DHE, Director of Military Aviation.

Confirmation of Telephone Message No. 3284/Mo. D Sent June 19, 1918, at 17.50 o'clock

(*Translation*)

COMMANDER CAQUOT,

Director of Aviation Technical Section to the Under-Secretary of State for Aeronautics.

TUNING UP OF LIBERTY MOTOR

In agreement with the Lorraine-Dietrich Co., which is willing to help us, I suggest that you should deliver to the Lorraine works the Liberty motor now at Chalais, in order to improve the carburetion. I am advising the American Aviation.

(Signed) CAQUOT.

—

An Appreciation

Editor AUTOMOTIVE INDUSTRIES:

I want to thank you for the space given in the current issue of AUTOMOTIVE INDUSTRIES to the Class B rules for tractor tests adopted by the American Society of Agricultural Engineers, and also for the editorial comment on these rules.

This publicity co-operation will be greatly appreciated by all the members of the American Society of Agricultural Engineers.

Thanking you for the courtesy, we are,

Yours very truly,

(Signed) RAYMOND OLNEY,

President American Society of Agricultural Engineers.

St. Joseph, Mo., June 10, 1919.

—

Berling Magneto on Bender Special

WE are informed of a mistake in the table in AUTOMOTIVE INDUSTRIES in which the equipment of the cars in the Indianapolis Speedway race was described. The table specified the Bosch magneto as a part of the equipment of the Bender Special. It appears that two weeks before the race this car was equipped with two Berling type 5-41 magnetos. This was the first use of Berlings in racing and reports to the company are that the operation was faultless.

—

Air Measurement—Errata

A NUMBER of typographical errors occurred in the article on Air Weight and Volume Measurement by Don T. Hastings in our June 12 issue, as follows:

P. 1282—col. 2—line 13—second t should be $t_1 = 71$ deg. Fahr.

P. 1282—col. 2—line 17—P should be P_1 and d should be d_1.

P. 1282—col. 2—line 22—$\frac{A_2}{A_1} = 0.200$ instead of 200.

P. 1287—col. 1—line 6 should read

$$b - e + 0.622e = b - 0.378e$$

the minus sign having been omitted.

—

THE annual meeting of the International Aeronautic Federation will be held in Brussels, the date to be fixed. Next year's meeting will be in Geneva. Aero Clubs of Japan and Brazil have been admitted.

Details of the Still Hydrocarbon-Steam Engine

British Product, Which Uses in Main Cylinder Any Form of Liquid or Gaseous Fuel Hitherto Employed, Ranked Above Diesel in Announcement

A GREAT deal of interest has developed in England in a new design of engine announced by W. J. Still, which he claims is more efficient than the Diesel engine. From a correspondent we learn that Mr. Still spent about half a million dollars in experimental work before announcing his engine. Following are some particulars of the Still engine taken from a paper read before the Royal Society of Arts by Frank D. Acland.

The Still engine is an engine capable of using in its main working cylinder any form of liquid or gaseous fuel hitherto employed; it makes use of the recoverable heat which passes through the surfaces of the combustion cylinder, as well as into the exhaust gases, for the evaporation of steam, which steam is expanded in the combustion cylinder itself on one side of the main piston, the combustion stroke acting on the other side. It increases the power of the engine and reduces the consumption of the fuel per horsepower developed.

Its primary object is not to use the waste heat for raising steam, but first to use it in improving the thermal conditions of the working cylinder, and so insure the maximum efficiency from the fuel burnt within it, diminishing, as a consequence, the heat lost in that operation. Since the maximum efficiency is obtained by combustion of the fuel in the cylinder, and the minimum by the evaporation of the water in the steam generator, it is evident that the larger the quantity of steam which can be generated per horsepower developed by the combustion cycle, the lower must be the heat efficiency of the whole machine.

In the Still engine—see diagram—the jacket and cooling water form part of the circulating system of a steam generator, which may be an integral part of the engine, or external to it. The cooling water therefore enters and leaves the jacket at a constant temperature, regulated by the pressure of the steam, the cooling being effected by converting the water into steam without raising its temperature. Excluding the radiation losses, which are kept low by lagging, all the heat which passes through the walls is thus usefully recovered in the water as steam. The temperature of the cylinder wall is uniform over the whole of its exterior surface, and the heat lost to the cooling water at each stage of the cycle—compression, combustion and expansion—is diminished.

During compression, owing to the walls being at steam temperature, the incoming charge picks up heat instead of losing it during the greater part of the stroke, an advantage of the greatest value to the heavy oil types of Still engines, where an air charge is taken in at the full out-stroke, and is compressed to a pressure where its increased temperature insures the certain ignition and combustion of the fuel which is injected into it.

During combustion and expansion the uniform and higher mean temperature of the walls reduces the heat lost to the jacket water. Some of the heat thus economized adds to the useful work on the piston, the balance passing out in the exhaust gases for recovery.

The cylinder of a Still engine consists of an inner liner, which is approximately one-third to one-fourth of the usual thickness; it is ribbed externally so as to add to its conducting surface and provide suitable passage for the cooling water, and it is reinforced by an outer hoop capable of withstanding the highest pressures to be met with in working. No failure of a cylinder of any kind has occurred, even under most severe, even abnormal test conditions, *e.g.*, with mean combustion pressures of 180 lb. per square inch in a two-stroke engine, to which was added overload steam mean pressures of 70 lb., *i.e.*, a total mean effective pressure per revolution of 250 lb. per square inch.

The Still engine may be of the constant volume or constant pressure type, or a combination of both; its losses to the cooling water are not the same as in a normal engine of either type, except in so far that they vary with the type, with the cycle, with the efficiency of the com-

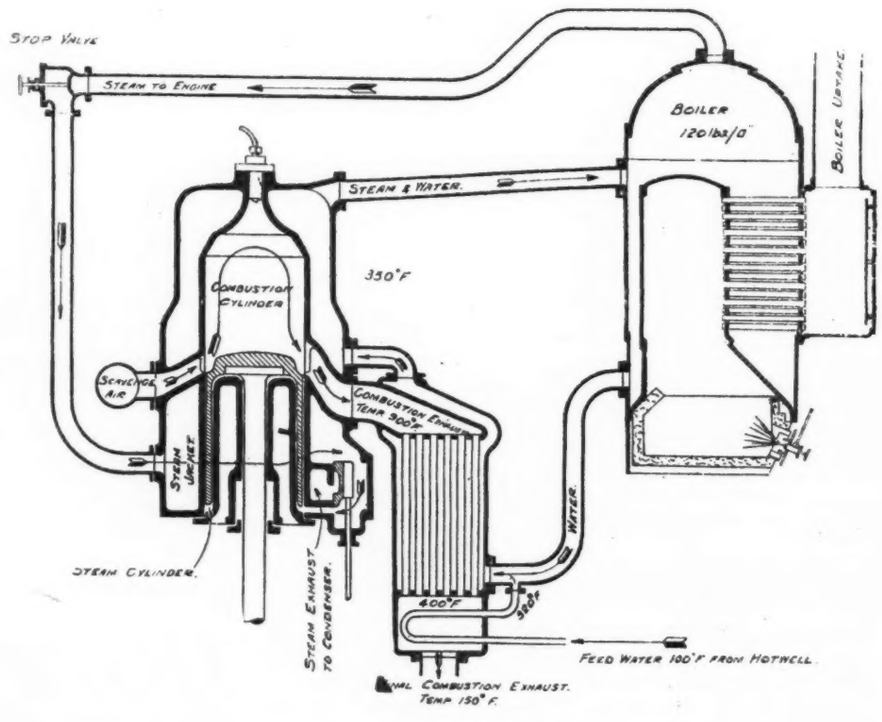


Diagram of Still engine

bustion stroke, and with the load. At normal and full loads, such heat units, in a Still engine, as pass into the jacket water, which is at steam temperature and pressure, are lessened and are wholly recovered without loss—radiation excluded—in overcoming the latent heat of the water and give off their steam in the steam space in proportion to the heat flow at those loads. At lower loads less steam is produced, until at still lower loads no steam at all is measurable. In other words, the jacket losses are practically eliminated.

Exhaust Gases

The exhaust gases take a subsidiary, but important, part in the cycle; their usefulness in ordinary combustion engines, in raising steam, is limited to the amount of heat recoverable between the initial temperature of the exhaust and that of, say, 50 deg. Fahr. above the steam temperature, after which the whole volume passes away to atmosphere at a still useful temperature, less a small percentage available for feed-water heating. But in the Still engine the exhaust gases, after raising their quantum of steam, are employed in preheating all the water required for the steam generated in the jacket water and in the generator. Trials at full efficiency over long periods and steady loads show terminal stack temperatures as low as 150 deg. Fahr. The heat efficiency of the combined cycles is therefore exceedingly good, with an initial temperature of over 2000 deg. Fahr. and a final exhaust to atmosphere at 150 deg. Fahr.

The quantity of steam capable of being generated from "waste heat" depends upon the efficiency of the combustion cycle, and on the load. Some years of experimental work prove that the weight of steam recovered may vary from a maximum of about 7 lb. per brake horsepower hour developed by the combustion cycle of a four-stroke constant volume engine at full load to a minimum at light loads which is hardly measurable, and which only balances the loss due to radiation.

The engine used for this research was of constant volume type, four-stroke. It first underwent a series of tests, so as to arrive at its "initial horsepower" as an explosion engine, *i.e.*, without any power added by the steam cycle, and was carefully checked in this connection by comparison with well-known and authenticated trials carried out by the late Prof. Bertram Hopkinson, F.R.S., and others. Though it was a single-cylinder unit with automatic inlet valves, its "initial horsepower" was rated on a par with the power given by four-cylinder sets with mechanically operated valves deduced from tests made over very short periods and under their best conditions.

The quantity of steam generated per "initial brake horsepower" from the jacket alone averaged 3.28 lb. per brake horsepower-hour, and from the jacket and exhaust together 6 lb. per brake horsepower-hour, this being the average of the whole of the trials over periods varying from 20 minutes to over six hours. The final six hours of a 7½ hours' continued test gave a total recovery of 6.9 lb. of steam per initial brake horsepower.

Normal load.—The average mean effective pressure from the combustion stroke was 90 lb. per square inch. The steam evaporated by the "waste heat" gave 14 lb. per square inch mean effective pressure on every return stroke. This is equivalent to 90 + 28 = 118 lb. per square inch mean effective pressure in a normal four-stroke engine.

Overload.—By admitting additional steam generated by fuel under the boiler, the steam mean effective pressure was raised to 72 lb. per square inch; the total mean effective pressure was therefore equal to 90 + 144 = 234 lb. per square inch mean effective pressure in a normal four-stroke engine.

The Still engine was first shown at the Aero-Marine Show held in London in April, 1914. Since that exhibition much of development work has been done on the engine.

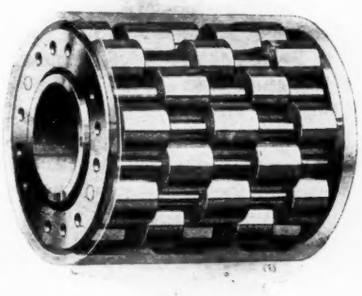
The Hart Roller Bearing

A NEW type of roller bearing with several staggered rows of rollers has been developed by the Hart Roller Bearing Co., East Orange, N. J. In the opinion of the designer of this bearing the great angular distance between adjacent rollers in an ordinary roller bearing with a single row of rollers is the cause of considerable strain on the bearing. This difficulty is overcome in the Hart bearing. Other improvements in the Hart construction are intended to promote the circulation of lubricant, to reduce the friction between the rollers and the cage, and to eliminate tilting of rollers due to variations in the position of the load on them.

In the Hart bearing the rollers are staggered, and two different widths of rollers are used, arranged with the staggered end in assembly and meshed, so that the entire surfaces of the shaft and the outer casing are covered. The rollers are mounted on alignment shafts supported at the end by retainer rings, in which they revolve freely.

The staggered arrangement of the rollers results in a reduction of the angular distance between adjacent lines of contact, which is claimed to reduce the strain to which the bearing rings are subjected. It also provides space for free circulation of oil or grease.

The Hart bearing can be arranged for operation in either a horizontal or a vertical plane, without any tendency to dragging due to frictional resistance between the rollers and cage, it is claimed. The end of any roller which is lightly loaded is free to rotate independently of the heavily loaded end. The result is a differential movement between individual sctions of a given roller, and the objectionable features of eccentric loading are thus overcome.



Hart roller bearings

It is claimed that the distinctive feature of the Hart roller bearing—its staggered and meshed roller arrangement—gives the bearing a greater load capacity than that of other bearings. The rollers are made of chrome-vanadium steel, and are carefully heat-treated. All parts of the bearing are accurately machined and ground. These bearings are designed for both light and heavy duty purposes, where radial bearing loads have to be supported. They are suited for use on trucks, farm tractors, jackshafts, marine shafts, line shafts, etc.

WRAPPING cross-grained struts with cotton tape according to standard methods has no appreciable effect on their strength. It is doubtful if any other methods of wrapping, such as cording, would increase the strength properties very greatly. There is also the probability that any wrapping or covering will be loosened by weather changes.

It is believed that canvas, tape or cord covering is of less value than the same volume of wood.

Farm Tractor Design

PART II

A Practical Example of Calculations Preceding the Design of a Tractor—Data Useful to the Tractor Engineer

By Joseph Jandasek, M. E., E. E.

IN plowing one acre of land the tractor travels a definite number of miles, depending on the number of bottoms and the width of each, as follows:

Plows	One 8-in.	One 10-in.	One 12-in.	One 14-in.
Miles	12.2	9.9	8.2	7
Plows	One 16-in.	Two 14-in.	Three 14-in.	
Miles	3.5	3.5	2.33	

A tractor pulling two 14-in. plows at a speed of 3½ m.p.h. plows just as much as a machine pulling three 14-in. plows at a speed of 2.33 m.p.h., viz., one acre per hour.

Acreage Per Mile Travel with Various Plowing Widths in Feet

Width	1	4	5	6	8	10
Acres	0.121	0.484	0.605	0.726	0.968	1.211

A strip 1 ft. wide and 43,560 ft. or 8.25 miles long equals one acre. A strip 99 in. wide and 1 mile long equals 43,560 sq. ft. or one acre.

What a two-plow tractor can accomplish in 8 hours' work at 2½ m.p.h. (no time being allowed for stops, though, of course, this amounts to a great percentage in some cases) is given herewith:

Plowing, two 14-in. plows	5.5	acres
Discing, 16-disk, 8 ft. wide disk harrow	20	acres
Harrowing, 3-section harrow, 5 ft. wide each	35	acres
Drilling, one 12 x 8—8-ft. drill	20	acres
Harvesting corn, one corn binder	9.5	acres
Harvesting grain, one 8-ft. grain binder	20	acres
Mowing, two 5-ft. mowers	24	acres
Hay loading, one 8-ft. rake loader and picks up a 20-ton load	13	acres
Planting corn, two planters, 40-in. rows	32	acres
42-in. rows	33.5	acres
44-in. rows	35	acres
Cultivating corn, one double-row cultivator, 40-in. rows	16	acres
42-in. rows	16.8	acres
44-in. rows	17.6	acres

Table I—Speeds and Drawbar Pulls

Miles per Hour	Feet per Minute	Pull in Lbs. per 1 H.P.
1	88	375
1¾	154	214
2	176	187
2¼	198	166
2½	220	150
2¾	242	136
3	264	125
3¼	286	115
3½	308	107
3¾	330	100
4	352	93
4½	396	83
5	440	75
5½	484	69
6	528	63
7	617	53
8	705	47

Table II—Wheel Diameters, Speeds of Revolution and Miles Per Hour

Miles per Hour	Wheel Diameter in Inches					
	36	42	48	52	54	56
1	9.3	8	7.0	6.4	6.2	6.0
2	18.7	16	14.0	13.0	12.4	12.0
2¼	21.0	18	15.7	14.5	14.0	13.5
2½	23.4	20	17.5	16.2	15.5	15.0
2¾	25.7	22	19.2	17.7	17.0	16.5
3	28.0	24	21.0	19.5	18.6	18.0
3¼	30.4	26	22.7	21.0	20.2	19.5
3½	32.7	28	24.5	22.5	21.7	21.0
4	37.4	32	28.0	25.7	24.8	24.0
5	46.8	40	35.0	32.2	31.0	30.0
6	56.0	48	42.0	38.7	37.2	36.0
7	65.4	56	49.0	45.0	43.4	42.0
8	74.8	64	56.0	51.6	49.6	48.0

Table III—Acres Plowed in 10 Hours at Various Speeds (No Time Allowed for Stops)

Miles per pound	One 16-in.	Two 12-in.	Two 14-in.	Three 14-in.
1¾	2.8	4.2	4.9	7.4
2	3.2	4.8	5.6	8.4
2¼	3.6	5.5	6.3	9.5
2½	4.0	6.0	7.0	10.5
2¾	4.4	6.6	7.7	11.5
3	4.8	7.2	8.4	12.7
3½	5.6	8.5	9.8	14.8

Practical Calculations

The following are taken as requirements: We have to build a tractor capable of pulling three 14-in. plows, climbing a gradient up to 10 per cent in soils with ground resistance up to 15 per cent, equipped with two driving wheels in the rear and two front wheels for steering, with three speeds forward and one reverse, a low speed of 2 m.p.h., a plowing speed of 3 m.p.h. and a high speed of 8 m.p.h.

SOLUTION: Since one 14-in. plow requires a pull of 1000 lb., the drawbar pull at plowing speed must be ..... 3000 lb.

and the rated pull at plowing speed, 0.80 × 3000 = ... 2400 lb.

Since weight = pull at plowing speed, the total weight should be about ..... 3000 lb.

The actual weight, however, will probably run a little higher, about ..... 3300 lb.

We also have:

Drawbar pull at low speed, equation

(2) $P_l = 1.5W = 4500$ lb.

Ground resistance (3) $t = 0.15$ (for stubble plowing)

grade resistance (5) $g = 0.10$

total rolling resistance $= (t + g)W = 750$ lb.

Drawbar horsepowers

(6) D.H.P. $= \frac{P_p}{375} S_p = 24$ hp. (not considered slippage)

(7) $$\text{B.H.P.} = \frac{P_p + (t+g)W}{375E_t} S_p = 35.3 \text{ hp.}$$

assuming $E_t = 0.84$.

Engine dimensions:

(27) $B = 0.765\sqrt{\text{B.H.P.}}$ (for 4-cylinder 4-cycle gasoline engines, 80 lb. mean effective brake pressure and 900 ft. per min. piston speed) $B = 4.55$ in.

$$L = 1.3B = 5.9 \text{ in.}$$

practically: $4\frac{1}{2} \times 6$

(11) $$N = 6\,\frac{W_p}{L} = \frac{6 \times 900}{6} = 900 \text{ r.p.m.}$$

Piston displacement: $c = \pi B^2 L$ (for 4 cyl.) $= 382$ cu. in.

$$\text{Checking: B.H.P.} = \frac{B^2LN}{12{,}600}4 = 35 \text{ hp.}$$

$$\text{Torque} = \frac{B^2L_p}{4} = 2420 \text{ in.-lb.}$$

Beltwork (one gearset between engine and pulley) using equation (14):

$$\text{Belt H.P.} = 0.95 \times 35 = 33.2 \text{ hp.}$$

Size of grain separator, 26 in.

Size of pulley:

(15) $$d = \frac{10{,}000}{n_p} \quad (n_p = N = 900)\, d = 11 \text{ in.}$$

face, $8\frac{1}{2}$ in.

Selecting 48-in. diameter of driving wheels as smallest practical we have

(32) $$n = \frac{S}{D} \quad 336$$

and gear ratio at plowing speed

(30) $$G = \frac{N}{n}, \text{ we obtain:}$$

at 2 m.p.h. . . . . $n = 14$ r.p.m., $g = 64.3$
at 5 m.p.h. . . . . $n = 21$ r.p.m., $g = 42.8$
at 8 m.p.h. . . . . $n = 56$ r.p.m., $g = 16.1$

Checking the pull and drawbar horsepowers:

(38) $$P = \frac{E_t G}{D} \times \frac{Cp}{2\pi} - (t+g)W$$

$$P_p = 2930 \text{ lb.}$$

(40) $$\text{D.H.P.} = \frac{NC4}{\pi 12{,}600} E_t - (t+g)W\,\frac{S_p}{375} = 23.5 \text{ hp.}$$

$$\text{Efficiency} = \frac{23.5}{35} = 0.67$$

Face of driving wheels,

(43) $$F = \frac{W}{34\sqrt{D}} = 12.4 \text{ in., we will take 12 in.}$$

Selecting a 36-in. diameter for the front wheels (largest possible), we have

(46) $$f = \frac{W}{100\sqrt{D_f}} = 4.9, \text{ we will take 5 in.}$$

Road work, for available pull on road we have

(55) $$P_r = \tfrac{2}{3}\ W = 2000 \text{ lb.}$$

and for weight which can be hauled on grades up to 10 per cent,

(58) $$W_h = 5\,P_2 = 10{,}000 \text{ lb.}$$

Weight distribution: according to formula (71) $a = 1.5 (6 + 12) + 24 \times 0.25 = a = 33$ in.

(73) Wheelbase $H = 2.5\ a = H = 82$ in.

(74) Tread $A = 2.25\ c = A = 54$ in.

c equals about to R_d.

Weight on front at standstill, using the formula (60):

$$W_f = W\frac{a}{H} = 1210 \text{ lb., or 40 per cent.}$$

$$W_d = 1790 \text{ lb., or 60 per cent.}$$

Weight distribution on level under the following conditions: $P = 1500$ lb. (500 lb. per plow), $h = 17$ in.:

$$a' = \frac{1500}{3000}\,17 + 24 \times 0.15 = 12.1 \text{ in.}$$

$$a = a' = 33 - 12.1 = 20.9 \text{ in.}$$

$$W'_f = 3000\ \frac{20.9}{82} = 765 \text{ lb.}$$

$$W'_a = 2235 \text{ lb.}$$

Weight efficiency in this case 74.5 per cent. Weight on front required for side draft,

$$a_s = 1.5 \times 6 = 9 \text{ in.}$$

$$W_s = 3000\,\frac{9}{82} = 330 \text{ lb.}$$

At what pull will tractor tip over (not considering shocks, inertia of the machine and of the flywheel) when (a) $h = 12$ in., (b) $h = 17$ in.?

(a) $$33 = \frac{P}{3000}\ 12 + 24 \times 0.25$$

$$P = 6750 \text{ lb.}$$

(b) $$33 = \frac{P}{3000}\ 17 + 24 \times 0.25$$

$$P = 4750 \text{ lb.}$$

From the above we can see how important it is to have the drawbar hitch comparatively low when plowing at low speed. Otherwise, there is danger that the tractor will tip over.

Table IV—Calculated Data of Different Size Tractors

Calculated in the same way as the foregoing practical example, with the following assumptions: All engines of the 4-cylinder 4-cycle gasoline type: $P_e = W$; $p = 80$ lb.; $V_p = 900$ ft. p. m.; $t + g = 0.25$ lb.; $E_t = 0.84$; $E_b = 0.95$; $n_p = N$; $i = 17$ lb.; $d = 1$ in.

	Bore and Stroke	C	N, r.p.m.	B.HP.	T	D.HP.	Belt, HP.	Size of Thresher	Size of Pulley	Dimensions of Rear Wheels	P, 2 m.p.h.	P, 3 m.p.h.	P, 6 m.p.h.	No. of Plows	G, 2 m.p.h.	G, 3 m.p.h.	G, 6 m.p.h.	Acres Plowed in 8 Hrs. at 3 m.p.h.	
1	3 x4	113	1350	15.4	720	10.3	14.6	....	$7\frac{1}{2}$x$5\frac{1}{2}$	42x 6	1930	1290	645	1—14 in.	84.5	56.4	28.2	3.4	1
2	$3\frac{1}{2}$x$4\frac{1}{2}$	138	1200	16.7	878	11.2	15.9	....	$8\frac{1}{4}$x$6\frac{1}{2}$	42x 7	2100	1400	700	1—16 in.	75.0	50.0	25.0	3.8	2
3	$3\frac{1}{4}$x$4\frac{1}{2}$	150	1200	18.0	955	12.1	17.1	....	$8\frac{1}{4}$x$6\frac{1}{2}$	42x 7	2270	1510	755	1—16 in.	75.0	50.0	25.0	3.8	3
4	$3\frac{1}{2}$x5	192	1080	21.0	1220	14.1	20.0	....	$9\frac{1}{4}$x$6\frac{1}{2}$	48x 8	2640	1760	880	2—12 in.	77.0	51.4	25.7	5.8	4
5	$3\frac{3}{4}$x$5\frac{1}{4}$	232	1029	24.0	1480	16.1	22.8	18	$9\frac{3}{4}$x$7\frac{1}{2}$	48x 9	3020	2000	1000	2—14 in.	73.5	49.0	24.5	6.7	5
6	4 x5	251	1080	27.4	1600	18.4	26.0	22	$9\frac{1}{4}$x$7\frac{1}{2}$	48x10	3450	2300	1150	2—14 in.	77.0	51.4	25.7	6.7	6
7	4 x$5\frac{1}{2}$	276	982	27.4	1755	18.4	26.0	22	10 x$7\frac{1}{2}$	48x10	3450	2300	1150	2—14 in.	70.0	46.6	23.3	6.7	7
8	4 x6	302	900	27.4	1920	18.4	26.0	22	11 x$7\frac{1}{2}$	48x10	3450	2300	1150	2—14 in.	64.3	42.8	21.4	6.7	8
9	$4\frac{1}{4}$x$5\frac{1}{2}$	311	982	30.8	1980	20.7	29.2	24	10 x$7\frac{1}{2}$	48x11	3880	2580	1290	3—12 in.	70.0	46.6	23.3	8.6	9
10	$4\frac{1}{4}$x6	340	900	30.8	2160	20.7	29.2	24	11 x$7\frac{1}{2}$	48x11	3880	2580	1290	3—12 in.	64.3	42.8	21.4	8.6	10
11	$4\frac{1}{2}$x6	381	900	34.6	2425	23.2	32.8	26	11 x$8\frac{1}{2}$	48x12	4350	2900	1450	3—14 in.	64.3	42.8	21.4	10.2	11
12	$4\frac{1}{2}$x$6\frac{3}{4}$	428	800	34.6	2720	23.2	32.7	26	$12\frac{1}{2}$x$8\frac{1}{2}$	48x12	4350	2900	1450	3—14 in.	57.0	38.0	19.0	10.2	12
13	$4\frac{3}{4}$x6	425	900	38.5	2705	25.8	36.6	28	11 x$8\frac{1}{2}$	54x13	4830	3220	1610	3—14 in.	75.0	50.0	25.0	10.2	13
14	$4\frac{3}{4}$x$6\frac{3}{4}$	476	800	38.5	3030	25.8	36.6	28	$12\frac{1}{2}$x$8\frac{1}{2}$	54x13	4830	3220	1610	3—14 in.	66.6	44.5	22.3	10.2	14
15	5 x$6\frac{1}{2}$	510	831	42.7	3245	28.7	40.5	30	12 x$9\frac{1}{2}$	54x14	5380	3580	1790	4—14 in.	69.3	46.3	23.2	13.4	15

AUTOMOTIVE INDUSTRIES
THE AUTOMOBILE

PUBLISHED WEEKLY

Vol. XL Thursday, June 19, 1919 No. 25

THE CLASS JOURNAL COMPANY
Horace M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
A. B. Swetland, General Manager
U. P. C. Building, 239 West 39th Street, New York City

BUSINESS DEPARTMENT
Harry Tipper, Manager

EDITORIAL
David Beecroft, Directing Editor
Clyde Jennings, Managing Editor

P. M. Heldt, DETROIT OFFICE, J. Edward Schipper
Sydney Oxberry, WASHINGTON OFFICE, Allen Sinsheimer

BRANCH OFFICES
Chicago—Mallers Bldg., 59 East Madison St., Phone Randolph 6960
Detroit—95 Fort Street, West, Phone Main 1351
Cleveland—Guardian Bldg., Phone Main 1142
Philadelphia—Widener Bldg., Phone Walnut 5601

Cable Address - - - - - Autoland, New York
Long Distance Telephone - - - - - 8760 Bryant, New York

SUBSCRIPTION RATES
United States and Mexico - - - - - One Year, $3.00
Canada - - - - - One Year, 5.00
Foreign Countries - - - - - One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order or Register your letter.

HORSELESS AGE SUBSCRIBERS
Subscriptions for the Horseless Age transferred to the subscription list of AUTOMOTIVE INDUSTRIES in the merging of the two publications will be completed in full by the weekly issues of AUTOMOTIVE INDUSTRIES to the dates of expiration shown on the records of the Horseless Age Co.

Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Let Us Have Free Discussions

THE annual summer meeting of the Society of Automotive Engineers will soon be under way. Ottawa Beach will be the Mecca of hundreds of engineers in this industry. Others allied with the industry in such a way as to make their experience invaluable will also be present.

A number of important papers are going to be presented for discussion at this meeting. Let them be discussed freely. If there has been any criticism of S. A. E. meetings in the past, it has been that there has been inadequate discussion. Papers have been read and while many have been eager to discuss them, the time was so limited that this was not possible.

This year a more open program has been adopted with the result that there will be more time for discussion. Let the members use it to advantage in bringing out the full meaning and value of these papers.

The Non-Stop Trans-Ocean Flight

ANOTHER milestone in the history of mechanical flight was passed last Sunday when the two British aviators Alcock and Brown succeeded in crossing the Atlantic Ocean in an airplane without an intermediate landing. It was a fine mechanical performance and a fine piece of sportsmanship. Alcock and Brown took long chances. Luck was with them and they won. They are entitled to all the credit which naturally is due to the first crew successfully to cross the ocean in a single stage.

From the details of the flight, the machines, etc., published elsewhere in this issue, it is apparent that Alcock surrounded himself with more safeguards than did Hawker, and this no doubt was one of the reasons for his success. In the first place, Alcock had two engines instead of a single one and therefore did not have all his eggs in one basket, as it were, though according to all accounts both of his engines ran perfectly throughout the trip. Secondly, he seems to have had a materially greater fuel reserve, which would have been a great help had wind and weather been at all unfavorable. As it turned out, the wind throughout the trip seems to have been very favorable, since the maximum speed claimed for the Vickers is only a little over 100 m. p. h. and the plan was to throttle the machine to 90 m. p. h. for the sake of reducing strains and minimizing the fuel consumption. Actually an average speed of 121 m. p. h. was maintained, which shows an average favorable wind of over 30 m. p. h. for the whole trip, if the intention of flying at 90 m. p. h. relative to the air was adhered to.

Mention of the favorable conditions is not made here to detract from the achievement of the intrepid aviators. In fact, the good weather conditions under which the trip was achieved bear testimony to their perspicuity, for it is one of the problems of a transatlantic flight to start when the weather promises to be favorable for the approximate length of time required for the trip.

The great flight has been achieved and will be recorded in history as a memorable event. It is reported that some of the other contestants who are still waiting in Newfoundland for a chance to start the trip will try to better Alcock's time. But with the *Daily Mail* prize won and the ocean once crossed in the air, much of the incentive for the hazardous trip has been eliminated. An improvement on Alcock's time is not only going to be a very difficult task but would mean very little in the way of furthering commercial aviation. What would be of great importance in this connection would be a reduction of the chances of non-success or the presentation of convincing proof that these chances are small when the proper precautions are taken. A succession of flights might have both these desirable results and the aircraft industries of the world may consider the lessons to be learned and the propaganda to be achieved worth the cost of renewed attempts.

Super-Induction in Commercial Engines

IN the past, engine development has been along the lines of greater flexibility, more silent operation and increased power in proportion to weight or displacement volume. In all of these respects the automobile engine has attained a very high standard. Little attention has yet been given to the problem of improving the fuel economy of the engine and it is obvious that under present conditions fuel economy is a very important characteristic. While the achievements in engine design in regard to flexibility, silence and high weight efficiency are highly valued, it may be necessary in the future to sacrifice some of the progress made along these lines in order to increase the fuel economy or make possible the use of cheaper fuels than the present motor gasoline. At any rate, any new design of engine will be judged very largely on the basis of its fuel economy.

It is for this reason that not much can be expected from super-induction engines in which the working cylinder is filled with charge to a pressure above atmospheric. Such an engine may be justified for war plane service where cost is a negligible factor and maximum speed counts for everything. But it is not a commercial possibility in an age where fuel conservation is one of the great needs.

A gasoline engine of the conventional four stroke type receiving more than a normal charge of explosive mixture works under substantially the same conditions as a steam engine with late cut-off. Both will develop abnormal power at the expense of economy. The chief reason for the decreased economy in the gasoline engine is that at the end of the stroke, since there is a great deal more burnt gas in the cylinder, the pressure of the gases—that is, the exhaust pressure—is much higher, and much more energy is thrown away in the exhaust. It is a fundamental principle of heat engines that the efficiency depends upon the initial and final temperatures of the expanding charge, and if the final temperature of the charge is raised the efficiency is lowered. A higher exhaust pressure means a higher final temperature.

If the fuel situation becomes sufficiently acute we may even see engines built with sub-normal induction so as to gain the advantage of expansion practically down to atmospheric pressure. This could be done by closing the inlet valves before the end of the inlet stroke. The compression space would, of course, have to be reduced so as to obtain full compression with a partial charge, as the compression has a strong influence on the efficiency. In a conventional four stroke engine the exhaust pressure under full load is about 50 lb. per square inch gage, and by farther expanding the gas considerable additional energy can be recovered. But this end is attained at the expense of some loss in the maximum output from an engine of given size.

Develop Foreign Parcel Post

AN extensive foreign parcel post system equal in rates and privileges with those of other nations is invaluable in the development of American export trade. The parcel post is the battery of foreign business. It carries the spark of interest in catalogs and other trade literature. It lights the way to big export trade and works constantly after big trade is started, connecting the importer and exporter when small parts and supplies are needed.

The service must be equal to that enjoyed by our competitors. So long as American manufacturers must pay higher rates and meet unreasonable regulations abroad, our parcel post, like the battery, is undercharged and useless. American shippers can not compete for trade in India so long as British makers can ship an 11-pound package to Calcutta for 72 cents, while the American pays $5.40. They can not sell in Brazil or Argentina when the customs brokers' fees and delivery charges are in excess of the worth of the parcel. They might as well try to start with a dead battery as to compete with such handicaps.

Frequently exporters encounter difficulties in the parcel post abroad which our authorities are unaware of until they are brought to their attention. Exporters encountering such difficulties will find the postal authorities keenly appreciative of specific examples of wrongs that may be righted. Foreign parcel post problems sent to the Second Assistant Postmaster General will meet with prompt attention.

Good Roads Duties

IT is up to everyone in any way connected with the automotive industry to stand behind the good roads movement which is sweeping throughout the country in order that it may be kept moving in the right direction.

The development of roads within the next few years is vital to this industry. Every mile of new road built through the rural districts creates prospects for trucks, automobiles and tractor sales.

Parts manufacturers are just as much interested in the good roads movement as the vehicle manufacturers. Just because a manufacturer is making jacks, spark plugs, wrenches, or axles is no reason why he should let the passenger car, truck or tractor manufacturer do the work.

Millions have been appropriated by various states for road construction this year. The big task now is to see that these millions are expended in a way to encourage future activities. An active interest should be maintained by those interested in watching the expenditure of the money. Do not let these funds become side tracked or misused, but concentrate them in such a way as to get the most and best roads for the money expended.

By united action, the endorsement for good roads can be made so strong that no one could afford to ignore it, and bear in mind that the manufacturer of multiple spindle drills, artificial leather, porcelain and any other line of wares in just as vitally interested as the automobile manufacturer.

Latest News of the

Overland Factory Is Back in Production

4,000 Return to Work—Plant Under Government Protection—Returned Workers Not Molested

TOLEDO, OHIO, June 17—All departments of the Willys-Overland plant are running to-day for the first time since June 3, when rioting caused the company to suspend operations. Approximately 4000 men are back at work. No cars are being turned out, and it may be 2 weeks before the first machines are completed. In some of the departments almost full crews are on the job, while in others work is being carried on by skeleton organizations.

The plant is operating under the protection of the United States District Court and is guarded by 270 special deputy marshals, as well as hundreds of factory guards, soldiers and policemen. The plant opened last Thursday and there has been no violence, although several arrests have been made for contempt of court. The union has pickets on all gates. They pass out cards stating their case and asking those who pass them not to enter, but there is no disorder.

Clarence A. Earl, vice-president and general manager of the Willys-Overland plant, said that petitions will be filed before Judge Killets in the District Court to-morrow, asking the court to make the injunction under which the factory is now operating permanent. This injunction limits picketing and gives the company full government protection.

Earl's Statement

Vice-president Earl said to-day: "Our plant is now in operation in all departments. We are getting under way as rapidly as possible for an increase to full production. The time for talk is over. It is time the company and its employees got back to work.

"The number of men who came to work Monday was greater than we expected. With continued excellent protection there is no reason why any man who wants to work should stay at home. We have extended a cordial welcome to all desirable employees, and we wish to reiterate that all such employees are welcome and are invited to return.

"But, in order that no worker may be misled, it is important that every employee understand clearly that we shall be obliged, in order to maintain balanced production and carry out our program, to fill with other workers the places of those who do not return promptly.

"Men who think for themselves have known from the start that the company's position has been not only fair, but extremely liberal. This strike has been one of the most unfair impositions ever imposed upon a group of fair-minded workmen. It has from the beginning been clearly a case of the radical minority intimidating the majority. We have now, and have had from the beginning, unbounded faith in the loyalty of the large majority of our employees, and we sympathize with those who have been misled."

—

AERIAL NAVIGATION IN BRAZIL

WASHINGTON, June 13—The Handley-Page Co., London, England, has secured concessions to operate airplanes in Brazil. The concession is for ten years but does not give exclusive monopolies on privileges. It further provides that within two years the Government may demand that the pilots be Brazilian citizens, and that the machines must be registered with the Inspector of Navigation.

The Handley-Page Co. will inaugurate an aerial line between Buenos Aires and Pernambuco and will use machines of 3000 hp. and capable of transporting 7700 lb. at an average speed of 112 kilometers per hour. It is expected that the voyage between Buenos Aires and Pernambuco will be made in three days with stops at Porto Alegre and Rio de Janeiro. The planes will travel by day only and the passengers will stop at night in hotels to be operated by the company. It is expected the service will start within six months. The airships will have a capacity for 12 passengers, with baggage, and one ton of freight.

—

RAINIER FOREIGN CONNECTIONS

FLUSHING N. Y., June 13—The export department of the Rainier Motor Corp. will be represented in Australia and New Zealand by the New York Oversea Co., New York City; in Norway by Haller, Kopsland & Co., Christiania, and in Greece by the Youroveta Home & Foreign Trade Co., New York City.

—

25,000 DODGES BEHIND ORDERS

DETROIT, June 16—Dodge Brothers are 25,000 cars behind orders. Production is between 450 and 500 cars daily. There are several trucks in use in Detroit with Dodge chassis. The company denies that it has any intention of going into the truck manufacturing business, although there has been a rumor to that effect here.

French Accuse A. E. F. of Destroying Vehicles

Burn Army Material to Procure Scrap for Sale According to Government Contract

PARIS, June 18 (*Special Cable*)—A violent storm of protest has been raging in the French press around the allegation that the American army is burning complete cars and destroying motorcycles and tanks at Romorantin, because of the refusal of the French Government to allow these vehicles to be disposed of in France.

The truth of the matter is that the American army automobile organizations are now cleaning up with a view of quick return to America. Under the agreement with the French Government, the Army is permitted to sell scrap material but must not allow complete vehicles to get on the market.

Many of the cars in stock have been through the war and are in such condition that they are not worth shipping home. The bodies of these cars are, of course, composed of wood and metal, and to release the metal so that it can be sold as scrap, the bodies have been burned. To have separated the metal by other means would have been a waste of labor. Partially wrecked motorcycles and tanks were included in this burning.

Later is was found that the French junk dealers had recovered entire frames from this scrap and were putting these on the market as such. This was regarded as a violation of the order that only scrap should be sold. To meet this condition, an order has been given that a Holt caterpillar tractor shall be run over these fire ruins before the scrap is sold.

French newspapers have obtained pictures of this tractor breaking up the scrap motorcycles and are using them as proof that the American army is wilfully destroying good vehicles.

—

FORDSON REDUCED $135

DETROIT, June 16—Henry Ford & Son is wiring all distributers of a reduction of $135 in the price of the Fordson tractor. The new price, effective at once, is $750. The old price was $885. The price to the distributer is $600 and he turns it over to the dealer at $635.

The Fordson tractor plant is now getting back into heavy production. Approximately 100 machines are being completed daily. A carrier system similar to the one in the Ford Motor Co. plant at Highland park is being installed.

Automotive Industries

Sale of British War Vehicles Begins

High Prices Are Paid for 300 Motorcycles at Auction—Trucks Next

LONDON, ENGLAND, June 3—The first of the Government sales of war vehicles has been held in the Royal Agricultural Hall, Islington, and 300 motorcycles were disposed of at amazing prices. The entire sale was by auction. Thirty thousand trucks and hundreds of cycles will be sold in a series of auctions.

Many of the cycles offered at this sale were in bad condition. The first lots offered had been in service, and in many cases handle bars and wheels were missing and often cylinders were gone.

Solo cycles that were more like scrap than vehicles brought an average price of $150. Damaged cycles with side cars attached brought $210 to $350.

Douglas motorcycles, still in crates and unused, ranged in price from $385 to $650. These cycles have twin horizontal opposed cylinder engines.

The Board of Trade has announced an additional ruling for the import of American cars. This is in behalf of the importers not established in 1913, and who have no basis of apportionment under existing regulations. These firms are to be permitted cars to a number to be agreed upon by all members of the Automobile Section of the American Chamber of Commerce. Licenses will be in force until Sept. 1, when revision will be made.

AIRCRAFT TOOLS FOR SALE

WASHINGTON, June 14—Aircraft production machine tools valued at $11,000,000 are available for sale by the War Department. Terms and time of sale have not yet been announced. It is expected that some of these tools will be sold in Europe.

NO CARS TO ARMY OFFICERS

WASHINGTON, June 16—No passenger cars will be sold by the War Department supply to army officers, as a result of a ruling made here to-day, following requests of officers to purchase some of the non-standard cars owned by the War Department. The War Department issued rulings against such sales.

NAVY GETS HISPANO-SUIZAS

WASHINGTON, June 13—The Air Service has transferred to the Navy Department 50 500-hp. Hispano-Suiza engines and spare parts for replacement, according to an announcement of the War Department. The Navy Department acquired the engines and parts at their actual cost to the War Department, which was $227,000. These engines were purchased by the War Department to equip bombing planes.

CODE REGULATING ACETYLENE

MILWAUKEE, June 16—To assist in the work of framing a new code on acetylene gas hazards to promote safety in the use of the process in all its phases, the Industrial Commission of Wisconsin has appointed the following experts as members of an advisory committee: Sidney J. Williams, secretary, National Safety Council, Chicago; P. D. Estes, Chicago, U. S. Bureau of Explosives; W. J. Fairbairn, secretary, Metal Trades and Founders' Association, Milwaukee; Jerry Sullivan, Milwaukee, representing Wisconsin Inspection Bureau; Julius P. Heil, The Heil Co., Milwaukee, representing manufacturers maintaining acetylene gas producer plants; Frank Ohde, Milwaukee, Wisconsin Federation of Labor; Prof. O. L. Kowallke, University of Wisconsin; M. A. Edger, boiler inspector, Industrial Commission, Milwaukee office. Mr. Edger is secretary of the committee.

PONTIAC SPRING REBUILDING

PONTIAC, June 11—The Pontiac Spring Works, a unit of the Standard Parts Co., Cleveland, which was destroyed by fire last March, will be rebuilt. Work will start within three weeks. The building will be brick and steel construction, 186 x 100 ft. A 2-story office building 63 x 87 ft. will also be built. The new plant will cost approximately $100,000. The new unit will house the forge department. The company is employing 300 men and expects to increase to 800.

CHEMICAL CO. IN CANADA

MARIETTA, OHIO, June 14—The Northwestern Chemical Co. opened a factory in Montreal on June 1, to take care of its Canadian business.

DIVIDENDS DECLARED

Michigan Drop Forge Co., Pontiac, monthly dividend of 15 cents a share on common stock, payable July 1 to stockholders of record June 15. An extra dividend of 10 cents a share has been declared payable on same terms.

Reo Motor Car Co., Lansing, regular quarterly dividend, 2½ per cent on common stock, payable July 1 to stockholders of record June 15.

95 Per Cent of Claims Adjusted in Detroit

Aircraft Contracts Valued at $50,000,000—75 Per Cent Ordnance Claims Settled

DETROIT, June 16—Ninety-five per cent of all claims before the adjustment officials of the Bureau of Aircraft Production have been settled. In the Detroit district 75 per cent of the ordnance claims have been settled. All of those remaining are in the process of adjustment, but it may be August 1 before final payment is made.

It was stated to-day that Fisher Body, Wilson Body, Packard, Lincoln, General Motors, Cadillac, Ford Motor, and all other big claims, with the exception of Willys-Overland, had been approved at Washington and paid. The Willys-Overland claim is delayed by incomplete documents, consequent on distractions due to labor troubles. Adjustment is expected within a few days. No figures are given out here on any of the claims.

The claims board of the Bureau of Aircraft Production did not handle as much cash as it thought it would. It was estimated by aircraft officials that at least $300,000,000 would be paid out to cover this district. Not including building and construction, claims which were handled by another board, payment of claims due to cancellation was approximately $60,000,000. Building, construction and equipment claims, which were settled in Washington, totaled approximately $50,000,000, aircraft officials estimated.

There were approximately 800 aircraft contracts in the Detroit district. Of this number, 50 were prime contract claims, the rest sub-contract. The total completed value of all aircraft contracts here was $500,000,000.

The big problem now before both boards is the disposal of material. Separate departments have been established for this work. Machines, equipment and material on hand will run high into the millions. An inventory is being taken. A great portion of this material is of great value. Some of it is worthless. Officials say it may take a year before all material is disposed of.

The Aircraft Board is moving from its offices in the Ford Service Building to the new Saxon plant, which the government leased at the outbreak of the war as a supply depot. It is now being converted into a warehouse for machines and material. The lease runs almost a year.

European Demand Is for Low and Medium Priced Cars

C. C. Hanch, in Report to N. A. C. C., Sees Big Market There If Restrictions Pass

War Departments in Those Countries Not Selling Equipment to Public

NEW YORK, June 16—Europe (without restrictions) is considered by C. C. Hanch, secretary of the National Automobile Chamber of Commerce, the greatest market for automotive apparatus outside North America, according to his report to the N. A. C. C. after his investigation of conditions in Great Britain, France and Italy for four months.

The greatest market in these countries will be for low priced and medium priced cars, such as four-cylinder types at $1,200, or less, and six-cylinder types at $1,600, or less, with a limited demand for high priced American cars, much the same as there is a limited demand for high priced European cars in America.

The possibilities of these countries for absorbing motor cars cannot be calculated entirely on a population basis, as the consensus of opinion is that the ratio of car population cannot be so high in European countries as in America. Notwithstanding the fact that comparisons may not be of value, Mr. Hanch has compiled figures on several of the European countries which are of interest.

Country	Population	Number of Cars	Car-Population Ratio
Great Britain	45,000,000	200,000	1 to 225
France	40,000,000	100,000	1 to 400
Italy	35,000,000	50 000	1 to 840
Belgium	7,000,000		
Total	127,000,000	350,000	1465

Production in 1918

During 1918 the British manufacturers produced 3937 vehicles consisting of passenger car chassis, military cars, ambulances, etc. Only a very few of the manufacturers were permitted to engage in this manufacture. The practical prohibition of the use of motor cars in England during the war makes it certain that even to-day there are fewer cars in use by civilians than there were in August, 1914.

There is a great deal of money in circulation in Great Britain and a strong demand for motor vehicles of all kinds. It is doubtful whether the British manufacturers can turn out within the next 2 years the number of motor vehicles needed by the public during the next 6 months. According to Mr. Hanch, only two of the British manufacturers of passenger cars are ready to make deliveries in any appreciable quantities.

In France, at the beginning of the war, the 100,000 motor vehicles in use were classified approximately as follows:

Passenger cars for business use	48,512
Passenger cars for general use	42,447
Motor trucks	6,000
Total	96,959

In August, 1914, the French Government requisitioned 40,000 passenger cars and 6000 motor trucks and if we deduct these from the total there remains 50,959 in the hands of the French public.

In addition to this number the French Government is reported to have in its possession 50,000 vehicles. Of these, one-half are in good condition and the remainder must be repaired.

If the 25,000 vehicles in good condition were immediately available for civilian use it would make 75,959 vehicles, and if the remaining 25,000 were repaired and turned over to the public a total of 100,959 would be available, which is approximately the same as in the hands of the public at the beginning of the war. These figures indicate that there should be a strong demand for motor vehicles in France and Mr. Hanch thinks the French manufacturers are over-estimating their ability to meet this demand.

Italian and Belgian Situation

Situations in Italy and Belgium are handled as one in Mr. Hanch's report, as he was not able to get accurate information on the number of vehicles in each country. Assuming that the Belgian vehicles were practically eliminated, the figures largely apply to Italy. The ability of the Belgian factories to cope with conditions has been shown in the recent articles in AUTOMOTIVE INDUSTRIES by W. F. Bradley, who visited these factories.

Mr. Hanch is of the opinion that a considerable field for the sale of motor trucks exists in Europe, especially for medium priced trucks of good quality.

In Great Britain, the total delivery of motor truck chassis for 1918 was 11,244, practically all of which were for military use. To-day the British military authorities hold 82,000 trucks, and it has not been indicated how many of these will be disposed of to the public, but estimates are that 80 per cent could be repaired.

France, at the beginning of the war, had 6000 motor trucks, which number has been very greatly increased by purchases from Italy, Great Britain and the U. S. A. for war uses. Mr. Hanch does not give any estimate as to the number of trucks at present held by the French military authorities or any indication as to what disposition is to be made of them.

Nothing with regard to the Italian truck situation is contained in his report.

—

BOOSTING NIGHT PRODUCTION

LANSING, Mich., June 17.—The Gier Pressed Steel Co. is increasing its night force and will boost night production. Day production was up to capacity several months ago.

8-Hour Day Brings Strike in France

Shops Closed Following Dispute Over Pay of Piece Workers

PARIS, June 3 (*Special Correspondence*)—A strike was declared yesterday throughout the entire engineering industry of Paris and neighborhood. This comprises all the automobile and aviation factories and affects 150,000 work people.

The cause of dispute is in the application of the 8-hour day. A few weeks ago, an agreement was arrived at between workmen and employers in the engineering trade whereby the 8-hour day should be adopted before the new French law went into effect. It was agreed that there should be no reduction in pay in consequence of the shorter work day. On the other hand, the workers agreed to speed up so that the same output should be obtained with 8 hours labor as with 10.

Some of the factory managers refused to increase piece wages, as they claimed that, the same output being assured, workers on piece would not suffer any loss. The men pointed out that until more modern machinery is adopted, and better shop methods put into force, it is impossible for them to increase the amount of work performed: therefore, the adoption of the 8-hour day is for them equivalent to a reduction in wages.

The men claim that the standard wage for skilled workers in the engineering industry should be 150 francs ($30) a week; semi-skilled laborers claim $26 a week and laborers $22 a week.

It is not so much, however, a question of standard wage which has caused the dispute as the remuneration of piece workers under the 8-hour scheme.

In the automobile and aviation industry, dissatisfaction appears to be greatest at the Renault, Panhard and Farman factories. The majority of the automobile factories around Paris closed yesterday, among those affected being Lorraine-Dietrich, Unic, Clement-Bayard, Darracq, De Dion-Bouton, Hotchkiss, Citroen, Mors, Charron, Saurer, Aries, Hispano-Suiza and Gnome.

In certain individual cases the factory owners have, by explaining the situation to their men, induced them to remain at work. One instance of this is the Delage factory, which, this morning, was working at full speed, although most of the neighboring establishments were closed.

—

TRANSPORT FACTORY

MOUNT PLEASANT, Mich., June 16—A $175,000 factory will be built for the Transport Truck Co. and is to be completed by the middle of August. It will be of brick construction, with concrete floors and steel sash. It will have a saw-tooth roof. The office will be in the factory proper until a new office building is put up. Work has already started on the new plant.

Peugeot Victory Surprises French

Change of Wheels Made by Thomas Blamed for Defeat of Ballot Cars

PARIS, June 3 (*Special Correspondence*)—There is much surprise in French automobile racing circles at the result of the Indianapoils 500-mile race. It was believed that the struggle would be a close one, but no one here expected that the five year-old Peugeot cars would figure prominently in a contest 500 miles in length. The winner was looked for in one of the four Ballot cars, the new Duesenbergs, or in De Palma's Packard.

There is no doubt that the maximum speed of these cars, which embodied an accumulation of five years' experience and experiment, is much higher than that of the pre-war Peugeots. The new Ballot cars are the latest word in French automobile engineering, and for them to have been beaten seems to implicate poor management at the last moment.

Charles Faroux, who is undoubtedly the most competent French critic, throws all the blame for the Ballot failure on René Thomas. Faroux explains that, owing to wrong information given by Thomas, the cars were sent into the race with too high gear ratio. Thomas cabled for authority to change wheels and tires for a smaller diameter. This was granted for Thomas's car only, and refused for the three others. Notwithstanding this, the wheels on all cars were changed. This brought about considerable tire trouble and, it is believed here, caused the cars to lose the race. Faroux writes on this point as follows:

Asked to See Duplicate Orders

"The thing is so extraordinary that I asked to be allowed to see duplicate copies of the orders given by Ballot to his men. Here is a case of an important manufacturer who has accomplished an unprecedented task by building four special cars in less than 15 weeks. He had the service of Henry, one of the best engineers, who took the trouble to plot the power curve of the motor and to calculate the right gear ratios. All of this is swept away, annihilated, reduced to nothing by reason of the fad of a driver, who needs a strong master over him.

"Fortunately Peugeot saved French honor; or the consequence of the undisciplined Thomas might have been still worse. I affirm that neither Wagner, nor Guyot, nor Bablot would have made such a mistake. But Thomas is terrible. He is his own worst enemy. As a driver he can bear comparison with the best; his daring, his accuracy, his coolness in a race place him in the first class; but he has already lost a number of races by reason of his mania for tinkering at the last moment.

"Three elements are necessary in order to win a race: the manufacturer, the engineer, the driver. Ballot built wonderful cars, which started favorites in the race; Henry has already shown his qualities; Thomas might have been the winner if he had been content to remain a race driver. Personally, I am not surprised. Talking with friends on Saturday regarding this race, I made the following remark:

"'Ballot would certainly be the winner if he had any other team captain than Thomas; but with Thomas there is always the danger of some freak idea at the last minute. Thomas, the race driver, is fine, but I have no confidence in Thomas the mechanic.'

"I have elaborated this point because it is full of lessons for our manufacturers. I have no reason to fear regarding the Ballot cars; they will show their worth on the first occasion. And if, on that date, Thomas is satisfied to stick to his steering wheel, which he handles in a masterly manner, he will doubtless be the winner. It is a debt he owes to his employer."

—

SHELDON ENTERTAINS S. A. E.

WILKES-BARRE, PA., June 17—The Pennsylvania section of the Society of Automotive Engineers was entertained at its annual meeting here on Saturday as guests of the Sheldon Axle & Spring Co. About 60 members of the S. A. E. inspected the Sheldon plant in the morning and were then taken out to dinner. A short meeting was held after the dinner, at which the by-laws of the main section were unanimously adopted and the results of the election of new officers announced as follows: Chairman, I. K. Brombaugh, Autocar Co., Ardmore, Pa., succeeding C. Mussleman; secretary, G. W. Smith, Victor Talking Machine Co., succeeding H. E. Rice, and treasurer, William H. Sackman, Light Foundry & Manufacturing Co., succeeding George Newkirk.

—

CASE AGAINST PREST-O-LITE

WASHINGTON, June 14—The chief allegation in the complaint filed last week by the Federal Trade Commission against the Prest-O-Lite Co., Indianapolis, concerns the deposit for steel cylinders required from the company's dealers. The company must file answer by July 24 to the charge that its practices are in restraint of trade under the Clayton Anti-Trust Act.

The complaint alleges that the Prest-O-Lite Co. makes contracts with purchasers provided that the buyer will make deposit on the steel cylinders in which the gas is delivered and that, when the cylinders are exhausted, they must be returned to the Prest-O-Lite Co., which agrees to supply other filled cylinders for the additional price of gas contained, but does not provide for any refund to the buyer of his original deposit on the cylinders except where the Prest-O-Lite Co. "unreasonably refuses" to issue any further cylinders to the purchaser.

These operations, the Commission alleges result in loss to the purchaser of the cash deposits in the event that he does not require further acetylene gas or buys it from a competing manufacturer.

The complaint also alleges that the statement in the contract to the effect that it is not practical or safe to refill the cylinders through any company other than the Prest-O-Lite Co. is a subterfuge to obtain monopoly. The cylinders, the Commission states, can be and have been safely refilled by other concerns.

Program of S. A. E. Summer Meeting

Technical Sessions in Mornings—Wireless Telephony and Gas Warfare Subjects for Evening

NEW YORK, June 18—The New York members of the Society of Automotive Engineers will leave for Ottawa Beach, Mich., in a special car attached to the Wolverine, over the New York Central at 5 p. m., Sunday. There is promise of a large attendance. The arrangements at Ottawa Beach are working out well and there is every prospect of an excellent meeting. The program to date, with the social features eliminated, follows:

Monday, 10 a.m.—Standards Committee meeting. All members invited. The following Divisions are expected to present reports: Aeronautic, electrical equipment, iron and steel, lighting, miscellaneous, motorcycle, shaft fittings, stationary engine and lighting plants, tire and rim, tractor, transmission and truck standards. 2 p.m.—Continuation of Standards Committee meeting. 4 p.m.—Meeting of Council. 8 p.m., Business Session—Presidential address, treasurer's report, report of Membership Committee, election of Nominating Committee members, report of Meetings Committee, discussion of future policy with respect to parts and accessory exhibits at summer meetings, new business, report of Standards Committee.

Tuesday, 10 a.m., Truck and Fuel Session—"Tests of Truck Axle Worms and Bearings," K. Heindlhofer; "Motor Truck Ability and Its Relation to Trend of Truck Design," L. P. Kalb; "Steel Truck Wheels," P. W. Klinger; "Motor Fuel Problem," Dr. Joseph E. Pogue; "Protective Coatings for Metals," E. T. Birdsall. 8 p.m.—Lecture on Wireless Telephony (to be accompanied by demonstration), E. H. Colpitts, assistant chief engineer, Western Electric Co.

Wednesday, 9:30 a.m., Passenger Car Session—Symposium and discussion on the future passenger car, E. H. Belden, H. M. Crane, L. H. Pomeroy, H. C. Snow, W. B. Stout; "Liberty Engine Materials and Their Use in Automotive Industry," Harold F. Wood; "Load Carrying Possibilities of Angular Contact Type Ball Bearings," F. C. Goldsmith. 8:30 p.m.—Talk on Gas Warfare by Dr. John Johnston, Professor of Chemistry, Yale University.

Thursday, 9:30 a.m., Army and Navy Session—"Development of 'NC' boats and Other Naval Aircraft," Commander J. C. Hunsaker, U. S. N.; Future Relations between the automotive industry and various army departments are to be outlined by representatives of the Department of Military Aeronautics, the Ordnance Department and the Motor Transport Corps. 2 p.m.—Exhibits of tanks and other automotive war equipment in action. 8 p.m.—Talk on experiences with A. E. F. and the armistice commission (to be illustrated by motion pictures), Lieut.-Col. A. J. Slade, U. S. A.

Friday, 9:30 a.m., Engine and Tractor Session—"Working Processes of Future Combustion Engines," Prof. C. A. Norman; "Relation of Tractor to Implement," Prof. E. A. White; "Electric Heat Treatment of Steel," H. P. MacDonald.

Reservations to date total 681.

Daniels Urges Aviation Fund

Reduction of Appropriation Calls for Protest from Navy Department Head

WASHINGTON, June 16—The reduction of Naval appropriations from $45,000,000 to $15,000,000 by the House Committee of Naval Affairs is meeting with strenuous objection from Secretary Daniels. He is carrying the fight to the Senate Naval Committee. Secretary Daniels' letter to the Chairman of the Senate Committee states that Great Britain has appropriated $320,000,000 for aviation for the current year for both military and naval purposes, and that the United States Navy should be provided with at least $36,000,000. His letter follows:

"The general board of the Navy, after extended hearings covering the whole field of aviation, recommended a program for the next fiscal year which our experts estimated would require the $45,000,000 originally asked for by me in Congress. I feel very strongly that the figure of $36,000,000 reported by the Senate naval committee during the last session should at least be provided.

"The naval bill as reported to the House has cut the appropriation for Navy aviation to $15,000,000. I deem it my duty to bring to your attention the fact that with this amount Navy aviation will practically 'mark time' during the next year, which should be a year of rapid development, and will be a year of rapid development of this arm of the Navy in countries other than the United States.

"This is sufficiently indicated by the fact that in Great Britain the appropriation for aviation made for the current year amounts in round figures to $320,000,000.

"This includes all aviation for military purposes and should, of course, be compared with the total contemplated appropriations for both Army and Navy in the United States, amounting to something like $30,000,000."

—

WASHINGTON, June 19—Secretary of the Navy Daniels and naval officers appeared before the Senate Naval Affairs Committee to-day and protested against the reduction of naval appropriations from $45,000,000 to $15,000,000.

Senator Paige, Chairman of the Committee, called a session to-day and stated that he was in favor of restoring the appropriation to at least $36,000,000.

Secretary Daniels declared that the future of the American Navy will be seriously endangered unless sufficient money is provided to keep up with the rapid trend of development in aviation. He stated that plans had been made for a naval aviation force of 563 officers and 4630 men, and a Marine Corps aviation force of 100 officers and 1000 men.

If the appropriation of $15,000,000 is not increased the Marine Corps force would be completely wiped out, and the other organization would be seriously crippled. At present there are 12 naval air stations, four schools and one experiment station, and these will be considerably limited with all experimental work discontinued unless the appropriation is adequate.

—

MEXICAN PETROLEUM INQUIRY

WASHINGTON, June 14—An official commission from Italy is en route to Mexico to study the Mexican petroleum laws. It is anticipated that other countries will also send delegates.

—

NO MOTORCYCLE PURCHASE

WASHINGTON, June 14—The purchase of motorcycles for the War Department has been completely discontinued and instructions have been issued to the chiefs of the various bureaus that no more motorcycles are to be purchased without first securing the permission of the Secretary of War.

—

REDUCE WAR VEHICLE ORDERS

WASHINGTON, June 13—The contracts for motor vehicles placed by the War Department during the war and amounting in all to $416,528,000 on Nov. 11, 1918, were reduced by cancellation or completion to $17,970,000 on May 17. Of the total 67 per cent was cancelled, 29 per cent filled, and 4 per cent still remains on order.

—

TIN IMPORTS PERMITTED

WASHINGTON, June 17—Importations of pig tin and all metal alloys containing tin, including tin drosses, tin oxides, solder drosses, type metals, antifriction metals, waste metals, and other metals containing tin may now be licensed, according to a ruling of the War Trade Board, subject to the following conditions and limitations: That such licenses will permit the importation only of shipments made from points of origin on and after June 30, 1919; and that such import licenses will not be valid for entry until August, 1919.

—

TRAILER OWNERS FIGHT BILL

BOSTON, June 16—Owners of trailers are making an active fight on the proposed motor vehicle tax bill reported by the Committee on Roads and Bridges as House Bill 1748

It develops that this bill requires trailers fitted with solid rubber tires to pay the same tax as motor trucks, and that steel tired trailers pay double this tax. A 5-ton rubber tired trailer will be taxed $100 a year if this bill becomes a law and a 5-ton steel tired trailer must pay $200, or 15 per cent of the cost of the trailer annually.

—

AXLE FOR BENTON HARBOR

BENTON HARBOR, MICH., June 16—The Frederickson Axle Co. has purchased the Cutler warehouse here, where it will locate its plant, employing 40 to 50 men.

Argentina to Amend 1905 Trademark Law

New Bill Will Protect All Trademarks Recognized Through Treaty by U. S.

WASHINGTON, June 16—In order to protect trademarks and commercial names made and signed in Buenos Aires, Argentina, a bill has been introduced into Congress amending the trademark law of 1905 so that any trademark, registered in an international office or bureau, and recognized through treaty by the United States, will be considered a trademark for which application for registration has been filed, and on which the Patent Office can act accordingly.

The bill allows the same privileges as are afforded citizens of the United States on the application for registration of a trademark filed in an international bureau, provided that the application is made within six months of the date of original filing in the foreign country, and has been actually registered by the applicant in the country in which he is located.

Provision is also made to allow any individual to apply for cancellation of a trademark registration whenever he regards himself as being injured by it. Upon such application for cancellation, the Commissioner of Patents is authorized to investigate and withdraw the registration.

There is also a provision that any person who uses a deception in the selling of commodities by the use of a trademark which tends to falsify the origin of the merchandise when it is sold, either interstate or for export, will be liable for damages at the hands of anyone doing business in the locality that is falsely indicated as that of origin.

—

PATENT SYSTEM CHANGES

WASHINGTON, June 14—The patent committee of the National Research Council has approved proposed legislation to "increase the efficiency of the Patent Office in handling inventions and patents." The program calls for the establishment of a single court of Patent Appeals to take over the appellate jurisdiction now lodged in the nine independent Circuit Courts of Appeal, an increase in the personnel and in the salaries and a change in the law relating to the damages and infringement suits.

—

FOSTERING HOLLAND TRADE

NEW YORK, June 14—The Commercial Department of the Koninklyk Gezantschap der Nederlanden has been formed recently to foster trade between the United States and Holland, and is in a position to give commercial information about trade between the two countries to American merchants. Further information can be obtained from D. Andreae, Commercial Attaché, Koninklyk Gezantschap der Nederlanden, Washington, D. C.

Clifton Outlines the N. A. C. C. Work

Annual Address of President Shows Co-operation with Other Organizations

NEW YORK, June 16—The annual address of President Charles Clifton of the N. A. C. C., which has just been made public, tells some very interesting facts concerning the activities of the chamber and of the co-operation of the chamber with other automotive organizations.

As to the question of admitting tractor manufacturers to membership, the following paragraph is quoted from the address:

"A number of the tractor manufacturers have expressed the wish that they be admitted to the Chamber so as to take advantage of various departments like patents, traffic, legislative, publicity, etc. We find no uniform feeling among members interviewed in favor of such a plan, but later in the day all members here will be asked to express their thought on it."

There was some discussion, but no poll was taken.

Cross Licensing

The cross licensing agreement as to patents is referred to in the address. Since this address a motion has been filed to dismiss this suit, the attorneys for the Chamber setting forth that the Locomobile suit should be directed against other firms in the agreement and not against the Chamber. Of the suit, Mr. Coffin said:

"After operating successfully for four years, the Cross-Licensing Agreement has been made the subject of a suit by the Locomobile Company of America, which expresses the wish to be relieved of its obligations under it. The whole matter has been placed in the hands of Mr. Frederick P. Fish, who drew up the original Cross-Licensing Agreement. Mr. Riker, vice-president of the Locomobile Company, was a member of the Patents Committee during the formative period of the Cross-Licensing Agreement. The agreement generally has been looked upon as a broad piece of co-operative work, with no objection from any other source. Makers have gone on inventing and putting the results of their inventions into the Cross-Licensing Agreement. A big maker expressed it well the other day when he said that he was glad to take out patents as a protection from outsiders and to put them into the Cross-Licensing Agreement because his company always had at least a year's start on everybody else in their use, while in return they were getting the results of inventions by other parties to the agreement.

"The need for makers to continue inventing and taking out patents is evidenced by the fact that in the Cross-Licensing Agreement are 600 patents, while on file in our Patent Department are 117,000 patents (copies brought from Washington to our office here), all of which affect the automobile industry in some way. When the Attorney General of the United States was passing on the Cross-Licensing Agreement of the Aircraft Manufacturers, he had before him copies of the N. A. C. C. agreement and there never has been a suggestion from him that it was other than a legal document which attempted to lessen litigation. He did not object to a similar agreement, with many additions involving large sums of money, being put into operation by the aircraft manufacturers."

Listing Motor Vehicles as Commodities

Concerning the effort to have motor vehicles listed as commodities, so that the banking paper will be subject to rediscount in Federal Reserve Banks, the address says:

"Some time ago a presentation was made to the Federal Reserve Board with a view to having motor cars and motor trucks classed as marketable staples and the bankers acceptances in connection with them acceptable to the Federal Reserve Banks for rediscount, thus saving one-half to one per cent. While the board was unable to rule favorably on this subject and thus put the motor vehicles in the class with cotton, coffee, wheat and similar commodities, there was highly favorable expression of the importance of the industry, with a definite statement that the ruling did not detract from the worthiness of motor cars as security. Working with some of the western banks, a uniform campaign was started some time ago to insure a higher appreciation by the local banks throughout the country, of the products of our makers, to the end that even better accommodations can be given to dealers than during the past. Our interests lie with dealers and the Chamber's efforts are always directed toward those things which make for the dealer's prosperity."

Co-operation with Other Associations

On the subject of co-operation with other associations, Mr. Coffin says:

"We have co-operated in every way with other organizations in our line, in some cases contributing substantially to the helpful work that they were doing. These contributions include $10,000 to the American Automobile Association, $7,500 to the Society of Automotive Engineers, $5,000 to the National Industrial Conference Board, $1,000 to the Associated Advertising Clubs, $1,000 to the Highways Industry Association, $500 to the National Association of Credit Men, and $700 for membership in the U. S. Chamber of Commerce.

"In addition it has been felt that the helpful work of the dealers in New York and Chicago with whom we co-operate warrants their participation in the national shows we hold in these two cities. The dealers in Chicago were strongly opposed to conducting another show, declaring that only a national show brought the desired results for them and for the industry, with similar expressions from many of the dealers in New York. All felt, however, that their co-operation and help warranted their participation, and I know that members generally will agree that the directors have given only a proper recognition of their importance to our industry.

"It has been our pleasure to co-operate during the past year with the National Automobile Dealers' Association, Motor and Accessory Manufacturers, Automotive Jobbers' Association, Society of Automotive Engineers, American Automobile Association, National Traffic Association, Highways Industry Association, National Industries Conference Committee, Associated Advertising Clubs, National Association of Credit Men, and Chamber of Commerce of the U. S., together with a score or more of other organizations, all having interest in the making, selling or using of motor cars."

Menacing Legislation

Mr. Coffin points out that there is great need for legislative work, and declares means should be found to make the automotive interests a common one. He says:

"There is still more or less menacing legislation in the air. We have 6,000,000 owners of motor vehicles and while we have not hesitated even to advocate increased registration fees when the money is put on the roads, we do object to the singling out of our industry for taxes not placed on other users of the highway. We advocate the uniform bill prepared by the Highways Industry Association, the main points of which have been printed and distributed by the American Automobile Association, and which calls for certain limitations as to weights and sizes of vehicles for use on the road, together with proper sizes of tires and proper speeds. We have advocated taxes not in excess of 25c per horse power and 25c per hundred pounds in weight. Our committee has appeared and helped in various states throughout the country where the local associations require assistance. We have supplied literature and experts to give information to the legislators but your directors have never deemed it advisable to contribute financially to such work."

—

MOTOR VEHICLES RETURNED

WASHINGTON, June 14—The American Expeditionary Forces have been instructed to return all class B 3-ton standardized army trucks to the United States, together with all new truck dump bodies and all Dodges and Cadillacs that are boxed or crated.

The final disposition of these has not yet been determined, but it is anticipated that they will form a part of the permanent equipment of the United States Army. A total of 18,826 class B trucks, 2952 Dodges and 1399 Cadillacs were shipped to France up to the signing of the armistice. Many of these have been destroyed in battle or through wear and tear.

Effort to Reduce Car Taxes Abroad

Situation in Europe as Presented by C. C. Hanch—Gas Problems

NEW YORK, June 16—Interesting comment on the taxes on motor cars in European countries is contained in the report C. C. Hanch read to the National Automobile Chamber of Commerce on his return from a four months' investigating tour in Europe.

The annual taxes in Great Britain are tabulated as follows:

	About
Not over 6½ hp.....	$10.50
Over 6½ hp. to 12 hp.....	15.75
Over 12 hp. to 16 hp.....	21.00
Over 16 hp. to 26 hp.....	31.50
Over 26 hp. to 33 hp.....	42.00
Over 33 hp. to 40 hp.....	52.50
Over 40 hp. to 60 hp.....	105.00
Over 60 hp.....	210.00

On the subject of running cost Mr. Hanch says:

"Prices of gasoline in England vary from 75 cents to $1 per gallon, according to quality. Of this price until lately the tax has been 24 cents per gallon, but the surtax of 12 cents per gallon has recently been removed, leaving the Government tax of 12 cents per gallon.

Tax in France and Italy

"FRANCE—Purchasers of both new and second-hand cars pay a luxury tax amounting to 10 per cent of the value of the car. The annual or circulation tax is based on horsepower and varies in different places. As an example, the tax on a 15 hp. car varies from $35 to $100 according to locality. The present price of gasoline is $1.08 per gallon, of which 32 cents per gallon is tax. There is also an 80 per cent war profits tax. The prewar price of gasoline in France was 56 cents per gallon, of which 32 cents per gallon was tax.

"ITALY—The annual or circulation tax for an average car is about $120 per year. The tax on gasoline is about $4.60 per quintal, of 220 pounds, or about 12 cents per gallon."

As to efforts to obtain a reduction in taxes, Mr. Hanch says:

"The general Congress of the Inter-Allied Automobile Manufacturers held in Paris on March 5 and 6, 1919, decided that efforts should be made simultaneously in all Allied countries to obtain a reduction of annual taxes and license fees, these efforts to be supported by publicity pointing out among other arguments the following facts:

"That the automobile industry of the allied countries took first place in the intensive production of war supplies.

"That motor transport service rendered to the fighting armies was of the greatest importance.

"That transportation of passengers and materials by motor vehicles is now one of the necessary conditions of modern life.

"That the use of motor vehicles generally and for a long time past has ceased to be a luxury and has become the auxiliary of trade and industry.

"That the proceeds of license fees and taxes should be used for the maintenance and betterment of roads."

Used Passenger Cars Have Fabulous Value in England

Advertisement in London Times Offering Used Cars for Sale at Prices Doubling and Tripling Cost When New—French and Italian Models Included

LONDON, ENGLAND, May 27—Today's London *Times* carries an advertisement offering a number of used passenger cars at prices which are calculated to stagger motoring humanity when compared with the prices at which the same cars were sold when new. The explanation of the enormous increase is found in the fact that England is suffering from a car-famine of unparalleled severity. No passenger cars have been built, except for war service, for over four years, and one of the first military orders issued in August, 1914, commandeered all privately owned cars for army service.

The prices given in the table below have been reduced to dollars from pounds sterling at the current rate of exchange in New York.

*Used Car Price in 1919	Make and Type	Year	Original Price When New
$23,150.00	Rolls-Royce, 5-pass.	1915	$6,250.50
21,992.50	Rolls-Royce, All-weather	1915	6,945.00
20,140.50	Rolls-Royce, 5-pass.	1915	6,250.50
19,677.50	Rolls-Royce, 4-pass.	1914	6,250.50
18,520.00	Rolls-Royce, 5-pass.	1914	6,250.50
18,520.00	Rolls-Royce, All-weather	1914	6,482.00
17,262.50	Rolls-Royce, 5-pass.	1914	6,250.50
16,205.00	Rolls-Royce Coupé	1914	6,945.00
13,890.00	Rolls-Royce	1914	†
12,732.50	Rolls-Royce Sport	1913	6,019.00
11,575.00	Rolls-Royce, 5-pass.	1913	6,109.00
10,417.50	Rolls-Royce, Torpedo	1913	6,109.00
7,176.50	Fiat, Sport	1917	4,630.00
6 829.25	Nazzaro, All-weather	1915	3,935.50
6,019.00	Fiat, 5-pass.	1916	3,472.50
5,845.37	Fiat, Sport	1916	†
5,845.37	Minerva, Landaulet	1913	3,067.37
5,787.50	Fiat, Torpedo	1915	3,472.50
5,787.50	De Dion, All-weather	1915	3,241.00
4,861.50	Minerva, Landaulet	1914	3,067.37
4,167.00	Wolesley, Cabriolet	1913	†
4,051.50	Maudslay, Landaulet	1914	†
4,051.50	Darracq, Landaulet	1916	2,754.85
4,051.50	Oakland, All-weather	1917	†
4,051.50	Germain-Daimler, Sport	1914	3,067.37
3,680.85	Peugeot, Sport	1915	†
3,472.50	Hupmobile, Coupé	1915	2,291.85
3,067.37	King, All-weather	1915	†
2,650.67	Morris-Cowley, Coupé	1916	2,025.63
2,187.67	Calthorpe, Coupé	1917	†

*To arrive at the cost of any of these used cars delivered in the United States, add 45 per cent import duty; also freight and insurance. Possible loss through fluctuation of exchange rate would be another factor for consideration.

†Special models; original prices not obtainable.

DISPOSAL OF WAR VEHICLES

WASHINGTON, June 16—The transfer of the 39,100 surplus motor vehicles to other government departments as approved last week by the Director of Sales of the War Department included 3,600 motorcycles, 5,500 passenger cars and about 30,000 trucks. The Post Office Department will receive 10,064 of these vehicles, the Public Health Service 1,396, and the Bureau of Public Roads, Department of Agriculture, 27,983.

ENGLAND LICENSES 411,791 CARS

LONDON, ENGLAND, May 22—Car licenses in England, as reported including the 6th and 7th issues, in the Board of Trade Journal, total 411,791, which seems to be a fair estimate of all the cars in use at present in the country Complete figures for the 6th and 7th issues follow:

	6th issue	7th issue
Form 1, Private cars.....	93,947	
Form 1A, Private cycles..	56,309	
New series: 1 and 1A private cars and cycles....	76,605	
Form 2, Doctors' cars....	12,073	
Form 3, Hackney vehicles.	25,827	
Form 4, Commercial vehicles	47,388	37,837
Form 5, Industrial processes	61,805	
Total	373,954	37,837

Allied Control of German Aeronautics

Peace Treaty Provides for Aeronautical Inter-Allied Commission—Restrictions on Trade

WASHINGTON, June 16—Complete control of German aeronautic activities by an Aeronautical Inter-allied Commission is forecast in a copy of the peace treaty which was published in the Congressional Record.

Clauses provide that the armed forces of Germany must not include military or naval air forces, that Germany may maintain a maximum of 100 seaplanes or flying boats up to Oct. 1, 1919, to be used exclusively for searching for submarine mines. These boats may carry one spare engine in addition to the engines installed. No dirigibles shall be kept. Within two months after the signing of the treaty the personnel of the German air forces on land and sea must be demobilized. Up to Oct. 1, 1919, a total organization of 1,000 men may be maintained.

The Allies retain freedom of passage through the air over Germany until after the complete evacuation of German territory by allied troops. Complete prohibition of the manufacture or importation of aircraft or parts including engines is ordered for six months following enforcement of the treaty, and on the coming into force of the treaty all military and naval aeronautical material, excepting that mentioned above, must be delivered to the allies within three months.

This material will include completed airplanes and seaplanes as well as those partly manufactured or assembled, dirigibles completed and partially completed, plans for the manufacture of hydrogen, dirigible sheds and shelters of every kind for aircraft, aircraft engines, nacelles and fuselages, all aeronautical armament, munitions, instruments, wireless and photographic apparatus and cinematograph apparatus for use on aircraft.

The German Government must further extend every aid to the Aeronautical Inter-allied Commission for the execution of these clauses. It will further give every aid to make inventory of the aeronautical material in German territory, to inspect airplane, balloon and engine fixtures and aircraft armament fixtures, to visit all aerodromes, sheds, landing fields, and to authorize, where necessary, removal and delivery of material.

The German government must further furnish the Commission all information and legislative, administrative or other documents which the Commission may consider necessary to insure the complete execution of the air clauses of the treaty and particularly a list of the German air service personnel and of the existing material as well as that in process of manufacture or on order and a list of all establishments engaged in aviation manufacture and of all sheds and landing grounds.

That the export of American automotive products into Germany and German territory will not be prohibited is assured by the clause providing that Germany will not prohibit the importation of any product from any of the allied countries without equally extended restriction to the importation of like products from any other states or foreign countries.

Protection against high and partial tariffs is insured by the clause which prohibits Germany from attaching such duties to products from any of the allied countries in excess of those duties placed on the same goods from any other foreign countries. Furthermore, Germany undertakes to make no discrimination against the commerce of any allied or associated country as compared with the commerce of any other foreign country, either by direct or indirect means, including customs regulations, methods of verification, conditions of payment, etc.

Furthermore, Germany is forbidden to impose any restriction on the exportation of any commodities from her territory to any of the allied countries without placing that same restriction upon the same commodities when exported to any foreign country and grants every privilege in regard to import, export or transport of goods given to any foreign country equal to the allied countries.

Protection against the sale of articles which bear trademarks or descriptions fraudulently is prohibited.

—

U. S. LOST 357 PLANES

WASHINGTON, June 16—The American Air Service inflicted double the loss upon the Germans which they suffered in airplanes and balloons. A total of 755 enemy planes and 71 balloons were destroyed. The American losses were 357 planes and 43 balloons.

—

AIR APPROPRIATION OF $13,000,000

WASHINGTON, June 16—Appropriations for the Army Air Service have been placed at $13,000,000 by the House Military Affairs Committee. It is claimed by military officials that this sounds the knell of aviation in the United States because it is insufficient.

—

AERONAUTICS IN COLLEGES

WASHINGTON, June 14—Aeronautics has been established as one of the optional subjects at several universities in England, according to a trade report, and chairs of aeronautics have been established at the universities of Cambridge and London. Aeronautical scholarships have been instituted. Several English schools have secured airplanes, engines and other equipment for their engineering classes.

—

TACOMA RACES

TACOMA, WASH., June 14—Eddie Rickenbacker will be official referee July 4 in the events on the speedway here. Louis Chevrolet, Dario Resta, Cliff Durant, Eddie Hearne and Ralph Mulford will take part in the races.

Exports of Tractor Engines During April, 1919

Countries	Number	Value
Belgium	6	$8,461
Denmark	49	48,200
France	542	536,067
Italy	83	164,715
Norway	42	36,689
Spain	10	16,030
England	217	136,154
Ireland	22	23,515
Canada	1,005	842,266
Costa Rica	1	1,685
Honduras	4	9,545
Mexico	67	53,059
Jamaica	2	3,244
Trinidad and Tobago	1	1,744
Cuba	34	27,350
Virgin Islands of United States	1	777
Argentina	100	82,941
Brazil	3	3,570
Chile	1	571
British Guiana	12	15,790
Peru	25	37,026
Venezuela	1	1,326
Other British East Indies (Exc. British India and Sts. Settlements)	2	1,552
Dutch East Indies	...	....
Japan	1	678
Australia	59	68,851
New Zealand	14	15,874
Philippine Islands	...	....
British South Africa	1	369
Total	2,305	$2,138,049

During wartime we exported thousands of tractor engines. Most of these were used in connection with the hauling of heavy field guns. Under post-war conditions figures are well maintained and the engines are being used for farm tractors.

—

REORGANIZE AIR COMMITTEE

WASHINGTON, June 13—The National Advisory Committee for Aeronautics has been reorganized so that the executive committee will include 6 sub-committees on aerodynamics, power plants for aircraft, materials for aircraft, personnel, buildings and equipment, publications and intelligence and governmental relations.

The committees on aerodynamics, power plants for aircraft and materials for aircraft will attack the various problems relating to these subjects, coordinate research, act as mediums for the exchange of information and conduct laboratory tests.

The committee on personnel, buildings and equipment will initiate projects concerning the erection or alteration of buildings. The publications and intelligence committee will collect and classify knowledge on aeronautics, including the results of research and experimental work done in all parts of the world, supervise the office of Aeronautical Intelligence and the foreign office in Paris.

—

AIRCRAFT CONTRACTS SETTLED

WASHINGTON, June 16—Contracts with aircraft manufacturers have in great part been settled by the War Department and will all be completed within the next ten days.

CHANGE IN FOREIGN FORD POLICY

LONDON, June 1—The announcement that Sir Percival Perry is retiring as managing director of the Ford interests in the United Kingdom is taken as an indication that there will be a change in the Ford policy on this side. It is believed that the English practices will be made to correspond with those in America.

The British management of the Ford interests has allowed certain picked territories exclusively to a few distributers, leaving it to them to adjust commissions with sub-dealers. This has caused a great deal of dissatisfaction among the smaller dealers as the discounts have ranged from 7½ to 10 per cent for the smaller dealers to as high as 20 to 25 for the big dealers. It is believed that the American Ford organization will take a controlling hand in the management of the selling policy over here.

It is understood that Sir Percival Perry will retain his interest in the Fordson plant so that he will continue to be associated with the Fords.

—

Asher Golden has been appointed by the Compagnie d'Applications Mécaniques, Paris, its exclusive agent in the United States for the sales of RBF bearings and retainers.

Miss Ruth Edwards, who has been treasurer of the Bantam Ball Bearing Co, Bantam, Conn., for the past three years, has resigned her position. She has been with the company for 12 years.

J. W. McCabe, formerly district sales manager of the Chicago Pneumatic Tool Co. at Buffalo, has been made special representative for that company's foreign trade department, and is about to make a trip through the Orient.

George W. Rowell, newspaper man, and formerly secretary and manager of the Upper Peninsula Development Bureau, has been made publicity and advertising manager of the Lloyd Mfg. Co., Menominee, Mich.

S. A. Schaeffer, foundry superintendent of the Fairbanks-Morse Co., Three Rivers, Mich., has resigned to become assistant superintendent of the Clarage Fan Co., Kalamazoo, Mich. He is succeeded by B. C. Page of Spokane, Wash.

F. L. Sanford will be in charge of the New York branch of the Dort Motor Car Co., Flint, which will be opened shortly in the Ehret Building, 58th Street and Broadway. Mr. Sanford was for several years manager of the Studebaker branch in New York.

—

DOBLE-DETROIT REORGANIZED

DETROIT, June 17—The Doble-Detroit Steam Car Co. is being reorganized. Details of the reorganization will be announced within 2 weeks. The company recently sold its manufacturing plant, but expects to build another. It is expected that the car will be placed on the market this fall. In the meantime the company will continue the manufacture of the Doble-Detroit heating system.

Men of the Industry

Changes in Personnel and Position

BEACHAM LEAVES BARLEY

E. H. Beacham, assistant to A. C. Barley, president of the Barley Motor Car Co., Kalamazoo, Mich., has resigned and gone to Chicago to accept a post with the Waldon W. Shaw Co., operating the Shaw Taxicab Co. and the Yellow Taxicab Co. He has been acting as general sales manager during the past six months. His successor has not been named.

—

H. L. Hall has resigned as branch manager of the Swinehart Tire & Rubber Co., and will return to the Troy Carriage Sunshade Co., with which he was previously connected for eight years. He will take charge of the Chicago office of the Troy Carriage Co. at 20 East Jackson Boulevard.

Charles M. Prendergast, recently general superintendent of the Briscoe Motor Corp., is general superintendent of the Auto Body Co., Lansing. He succeeds Alex Urquhart, who resigned after 18 years of service to become superintendent of the Lansing Body Co.

J. L. Justice, who for the past three years has been zone supervisor for the Maxwell Motor Co., Detroit, resigned to become general sales manager of the National Wire Wheel Works, Inc. He will have his office in the Book Building, Detroit.

C. E. Wilson, formerly of the Westinghouse Electric & Manufacturing Co., has been made manager of the motor equipment division of the Remy Electric Co., and will have charge of engineering and sales with headquarters in Detroit.

—

GOODYEAR PANAMA OFFICES

AKRON, June 17—The Goodyear Tire & Rubber Co. has opened central headquarters, with distributing warehouses, at Colon, Panama. J. H. Proeger, who has been branch manager at Havana, Cuba, for several years, is in charge.

The Panama office will serve Costa Rica, Nicaragua, Bolivia, Venezuela, Dutch Guiana, Guatemala, Panama, Chile, Peru, British Guiana, Honduras, Salvador, Colombia, Ecuador, French Guiana and the islands of the West Indies excepting Cuba, Porto Rico and the Dominican Republic.

—

NEW YORK REPRESENTATIVE

BAY CITY, MICH., June 17—The Machine Tool Engineering Co, 149 Broadway, New York City, will be the sales agent for the Smalley General Co. in New York and New England territory.

NEW BETHLEHEM VICE-PRESIDENT

H. B. Hall has been elected vice-president of the Bethlehem Motors Corp., Allentown, Pa. He will make his office in New York and look after the export activities of the company. He was formerly assistant general sales manager of the Bethlehem Motors Corp. and until recently president of the Chicago-Bethlehem Sales Co., Chicago.

—

Joseph Leopold has resigned as sales manager for the Jones-Motrola, Inc., to become sales manager of the Trego Motors Corp.

—

DINGEE INVENTOR DEAD

CHICAGO, June 13—W. W. Dingee, one of the pioneers in the manufacture of farm implements, died at his home here on May 25 at the age of 88. He perfected the Dingee horsepower and later was interested in machinery operated by steam. He was connected with the Sawyer Manufacturing Co. when the J. I. Case T. M. Co. purchased it in 1878, and was connected with the Case company until he retired from active business in 1906.

—

U. S. RUBBER HELPS SUBSIDIARY

DETROIT, June 13—The United States Rubber Co. will spend $3,000,000 this year in extensions and equipment to the works of Morgan & Wright, its subsidiary unit here.

—

TRACTOR BRAKE AND DRAWBAR HORSEPOWER RATING

(*Continued from page* 1383)

My idea of rating a tractor would be to first use a fixed piston speed in all formulæ and thus establish a brake horsepower which really means something. That is to say, engines so rated could be expected to endure and perform satisfactorily.

For the drawbar rating the S. A. E. or the Government should establish a laboratory equipment suitable for measuring the mechanical efficiency of the transmission, and also for finding the rolling resistance under a certain fixed condition. Each make of tractor could be thus tested, and the mechanical loss in the transmission and the rolling resistance subtracted from the brake horsepower would give a result which would be very close to correct in each special case, and would give manufacturers of lighter weight higher grade machinery actual credit in the rating of the tractor.

In figuring the brake horsepower of any tractor motor a reserve of power of approximately 25 per cent should be allowed for. In other words, if a motor actually develops 40 horsepower at a piston speed of, say, 850 feet per minute, the brake horsepower used in calculating drawbar pull should be 30. There are two reasons for this: First, the motor would always have power to meet the maker's rating and second, it is well known that an internal combustion motor of conventional type is most efficient in fuel consumption at 75-80 per cent of its capacity.

Tractors Conquer Colorado Desert

Farmers Convinced at Denver Demonstration That Machines Can Plow Virgin Land

DENVER, Col., June 13—Because of the tractor demonstration which has just closed here, it is believed that the work done in the 1200-acre sun-baked, virgin soil plain east of this city means the opening of 3,400,000 acres of such land to the tractors.

It has been a theory of the irrigated land farmer that the tractor was not suited to his work. He has pointed out that it often took 12 horses to draw a plow through this sort of earth, which never before was plowed. But he learned this week that the economic problem of plowing was the same, whether it was done by tractor or horse.

It is true that some of the smaller tractors did not run through this soil as they do the retilled soil in older country, but the fact remains that they did go through it. There was some backing and starting and heavy pulling, but in the end the soil was turned.

Almost every tractor maker in the country had a machine in this demonstration and most of them had all sizes. Also all kinds of implements and power utensils used on the farm were demonstrated. The mould board and the disk worked side by side. Reports are that in one or two instances the mould boards of the plows were ruined in a few hours' plowing. This may have been due to too fast plowing, for in many instances the mould board was functioning parallel with the disk plow. The disk reduces the draft in the very hard surface of sun-baked land, where the mould board plow leaves a glazed surface along the edge of the furrow.

The demonstration field was as dry as fields ever get outside a desert. The tractor has never figured prominently in the region where irrigation is needed to make farming possible, for reasons already stated. This demonstration has opened the eyes of the farmer to the possibility of big operations on this land.

There were farmers present from 15 States. The attendance was about 20,000 daily, and some days was estimated as high as 30,000. There are 4,000 tractors in use in Colorado. One revelation to many farmers was that the tractor would do all the work of the stationary engine, which represents heavy investments in this country because there is much need for power.

Manufacturers Learn Lessons

The manufacturer learned much. One thing was that too much must not be guaranteed for a tractor in this soil. It is a different proposition from that in older farming districts. He also learned that the big tractor, as a rule, was best suited for this job.

The demonstration was under the direction of the National Tractor Manufacturers' Association, aided by the Denver Civic and Commercial Association and the Denver Tractor Club.

—

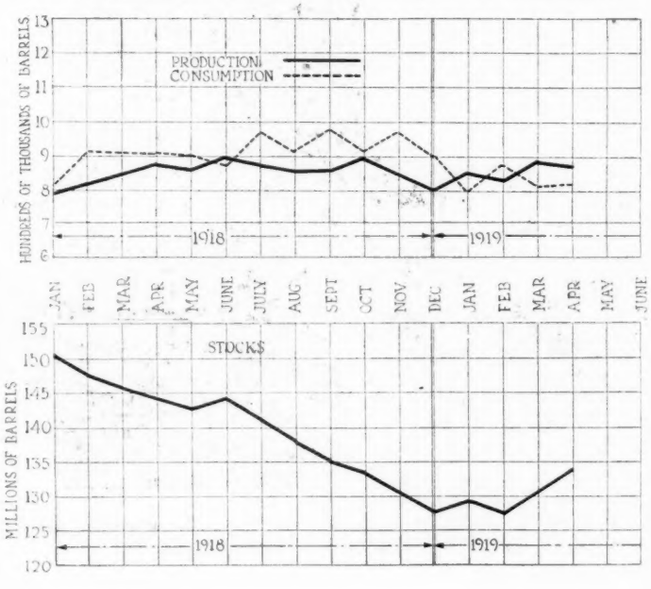
OIL PRODUCTION BULLETIN

WASHINGTON, June 13—A bulletin on the "Decline and Ultimate Production of Oil Wells with Notes on the Valuation of Oil Property," by Carl H. Beal, has just been issued by the Bureau of Mines, Department of the Interior, and and outlines methods for estimating the amount of oil that can be recovered from properties in the various oil fields of the U. S., and data on the application of these methods for the valuation of oil properties.

CRUDE PETROLEUM PRODUCTION IN EXCESS OF CONSUMPTION

Indications tend to show that the improvement is likely to be maintained.

WASHINGTON, June 12—The charts reproduced herewith show graphically the relatively great improvement in the crude petroleum position in comparison with that existing practically throughout 1918. During last year consumption was almost invariably in excess of production, the only exception being for a few days during the summer. This temporary gain was lost almost immediately and the position became more unfavorable than before. Production is now well above consumption and stocks show a gratifying increase.



Weird Cars Appear in Scandinavia

German War Loot Sold There—Skeleton Cars Offered on Long Credit

NEW YORK, June 17—Birger Jacobsson, who is in charge of automotive exports to Scandinavia for J. B. Crockett Co., has been in this country for two weeks seeking to expedite shipments of passenger cars. He says that his company has been unable to obtain all the cars needed for its trade, but that excellent truck deliveries are being made which are giving every satisfaction in the Scandinavian countries.

Scandinavia, according to Mr. Jacobsson, is practically a no man's land for the sale of cars, especially those coming from Germany.

"The Germans," he says, "are shipping some very strange cars into that country. Excellent Mercedes are arriving, with no tires and lacking decent paint and upholstering. While reports have it that there is rubber now in Germany, none is allowed for export. That country is still short of leather and textiles.

"These cars can be bought for 30,000 marks (about $2,000 at present value of the mark), but when the purchase is made the owner's troubles begin. He cannot buy tires to put on his car unless he disguises it. The Allies control the tires and they have a system of numbering that enables them to trace any tire found on a German car.

Rolls-Royce Cars Sold for $1,000

"Excellent Rolls-Royce and French cars are for sale in Scandinavia for $1,000 up, but they were all stolen from Belgium and France during the war. As soon as such a car is offered for export or is found outside Scandinavia by Allied officers, it is seized. The owners cannot buy supplies for these cars unless their origin is concealed.

"There are to-day some strange mixtures of equipment in the cars one sees in these countries. One finds Mercedes chassis with a Hall-Scott airplane engine installed. I have ridden in a Baby Peugeot equipped with a Ford engine.

"Strange engines of all makes are set in well known cars. Many of these engines were taken from captured airplanes and shipped abroad.

"The Germans are extending any credit desired on cars. They fear that money sent now will be taken away by the Allies."

Mr. Jacobsson returns to Scandinavia this week.

—

NEW PAINT MANUFACTURER

JACKSON, MICH., June 12—The Central City Paint Mfg. Co., with a capital stock of $300,000, has been formed here by John E. Van Horn. Mr. Van Horn started the Pontiac Mfg. Co. 16 years ago, disposing of this interest in 1918. The company will manufacture paint for the automotive industry.

Rules Governing National Tractor Demonstration at Wichita in July

Two Hours Are Allotted for the Public Exhibition—Land for Private Demonstrations Provided Daily—Draw for Positions on Opening Day

CHICAGO, June 16—The rules for the National Tractor Demonstration at Wichita have been drafted by the Tractor and Thresher Department of the National Implement & Vehicle Association. The rules are being demonstrated by the Chicago office of the Association. H. B. Dinneen, secretary of the Tractor Demonstration Committee, of Moline, Ill., is receiving entries. Other questions concerning the demonstration are being answered by A. E. Hildebrand, superintendent, at Bloomington, Ill.

The regional demonstration at Aberdeen, S. D., probably will be held the week of Aug. 18-23. No more regional demonstrations will be authorized. The rules for the Wichita demonstration follow:

1—Public demonstrations shall begin at 1 o'clock and end at 3, unless other hours are announced by the national demonstration committee at least 24 hr. before starting time. Private demonstrations may be held in the forenoon from 8 to 11:30 o'clock.

2—No exhibitor will be allowed more than one tractor of each size and type on the field during the public demonstration doing the same kind of work. He may have one or more machines performing different operations, namely: one plowing, one disking, one seeding, etc. Thursday morning from 9 to 11:30 will be devoted to seedbed preparation, seeding and cultivating.

3—Size of land for each tractor exhibitor for plowing demonstrations will be determined by the number of plow bottoms pulled, the width of plows and the highest plowing speed of tractor as given in entry blank. Each tractor exhibitor must plow out dead furrow to its left.

4—All exhibitors will be allotted land in the same field or adjoining field during each day's demonstration. Land for private demonstrations will be provided daily in one field or adjoining fields.

5—All plows on any given gang must be set at the same depth and kept there during the day's demonstration. This depth will be announced daily by general manager. Plows found operating otherwise will be ordered from the field for the balance of the day's work.

6—In all public demonstrations, the motor or tractor must not be run at more than 10 per cent above the highest speed of each as indicated in the entry.

7—Positions on field for each day will be arranged by lot in the following manner:

Separate drawings for each day's demonstration will take place at 10 a. m. Monday, the opening day of the demonstration. The drawings will be made from serial numbers representing total number of exhibitors.

Position on field for each public demonstration will be according to numbers, 1, 2, 3, 4, etc., as indicated by the drawing for that day.

The lowest number of land in each field shall be at point in field nearest general headquarters provided each exhibitor shall have all his land together.

Exhibitors who do not have representative at drawing will be represented by the general manager or someone appointed by him.

Each exhibitor will be required to finish his land daily in a workmanlike manner and assist in plowing the end lands as directed by the general manager.

8—Each field plowed will be surveyed and staked ready for afternoon demonstrations. These fields will be tested for the drawbar pull of a 14-in. plow, plowing at the depth specified previous to the demonstration. All manufacturers will be furnished information relative to drawbar pull so they can better determine the number of plows to use on each gang.

9—Each tractor shall bear a placard to be furnished by exhibitor, showing the brake horsepower of engine, the revolutions per minute, the plowing speed in miles per hour and the kind of fuel used and its Baume test. Tractors using more than 5 per cent of gasoline shall be classed as burning gasoline and be so placarded.

10—All tractors on the demonstration field belonging to one exhibitor must be kept on or along the land allotted him for that day's demonstration until the hour designated by management for returning to headquarters.

11—No machine will be allowed to operate with special equipment other than that designed for practical use with same. No spectacular methods will be permitted on the part of salesmen or others to attract crowds. The demonstration must speak for itself.

12—Each tractor exhibitor will have the privilege of burning any kind of fuel he desires, but no one will be permitted to burn fuel of a higher gravity test than that used by his competitor burning the same kind of fuel. All exhibitors will be required to obtain fuel from one source, such to be designated by general manager.

13—No time will be required of exhibitors to make moving pictures or group photographs for commercial purposes. Manufacturers can arrange to get photographs during the demonstration if they desire. Any manufacturer or representative of farm or trade papers or news agencies will be allowed to have their official photographer on the grounds to get pictures for their own use.

14—Manufacturers will be privileged to exhibit not more than one of a kind of belt-driven machines in connection with their exhibition.

15—The interpretation and enforcing of these rules shall be left to the national tractor farming demonstration committee and its general manager.

16—Each company exhibiting at these demonstrations shall appoint one manager who will be expected to report to the general manager not later than 8 o'clock each morning for instructions and information regarding the day's work. This manager of exhibits will be held accountable for the work of his company, and no instructions will be issued to anyone else, nor will requests, instructions or complaints be recognized from anyone but this exhibit manager. He shall wear a badge furnished him, specifying his being official exhibit manager.

17—Each exhibitor will be expected to keep plows, tractors, etc., around his tent arranged in first class order and the land allotted him for exhibiting purposes free from circulars, rubbish, etc., such as will be distributed around headquarters daily. They also will be expected to use care at all times in operating machinery with respect to its safety for all visitors. The management will appreciate co-operation of these exhibit managers in all matters.

18—Each entrant will sign the rules and thereby agree to live up to the rules and co-operate with the committee in every way to make the tractor demonstration a success.

19—The field manager shall have authority to order from the field any machine whose operator does not comply with the rules, and, further, any exhibitor who is manifestly disregarding the rules will not have land laid out or furnished for him on the succeeding days or until such time as he has met the condition.

20—No exhibitor joining the national demonstration will be permitted to exhibit until he has given correctly the price that he is in position to furnish tractors at regular production, the correct weight of tractors and all data pertaining to their construction and rating, minimum and maximum, speed at which the motors are to run, the committee to have the right to have any such machines placed under test to prove the correctness of the data that is furnished.

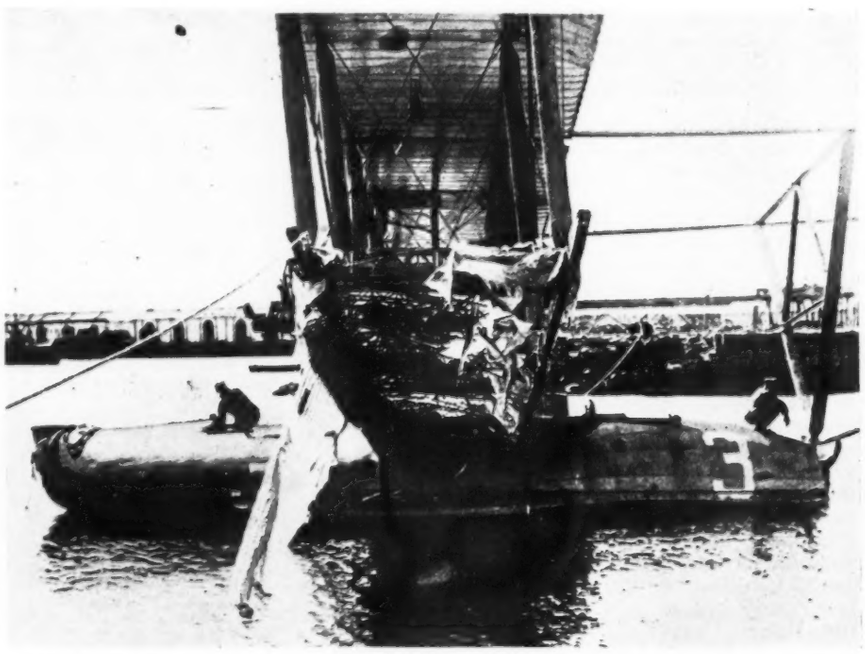
21—No exhibitor shall have more than twenty-five tractors of all types and kinds on the demonstration grounds.

Each exhibitor who is a member of the National Implement & Vehicle Association shall pay $100 entry fee to participate in the National Tractor Farming Demonstration for 1919, and each non-member shall pay $200 entry fee for the same privilege. Remittance shall accompany entry application. Entry fees are to be used for defraying the expenses of the demonstration.

—

CARS AND TRUCKS FOR U. S.

WASHINGTON, June 14—The United States Indian warehouse at Chicago has asked for bids for 17 light weight touring cars and 7 motor trucks with light delivery bodies. Bids will be received either from manufacturers or regular dealers.



The NC-3 at Ponta Delgada, showing damage to wing. Official photo by U. S. Naval Air Service

REPUBLIC SURPLUS $900,770

NEW YORK, June 16—The Republic Motor Truck Co., Inc., reported to the Stock Exchange a surplus of $900,770, after the payment of interest and other charges and war taxes, in a statement summarizing its affairs for nine months ending March 31 last. Net sales aggregated $12,039,474, and costs reached $10,545,582, leaving net profits of $1,493,892. The profit and loss surplus was given as $5,765,848, all figures including the Republic Motor Truck Co. of California.

—

NAPOLEON MAKING CARS

TRAVERSE CITY, MICH., June 14—The Napoleon Motors Co., manufacturers of Napoleon trucks, has not gone out of the passenger car business as has been reported, but is diverting its production to a great extent to the manufacture of trucks.

—

NEMOURS TRADING CORP.

NEW YORK, June 14—The Nemours Trading Corp. has been formed with a capital of $12,000,000 to take over the Allied Industries Corp., French-American Constructive Corp. and the Merchant & Manufacturers Exchange, the last of which owns the Grand Central Palace, which is to be used as headquarters for the new corporation as soon as it is released by the Government. Associated with this corporation will be Bonright & Co., bankers.

The Nemours Trading Corp. is incorporated as domestic and foreign manufacturers' representatives and general shipping merchants. They are exclusive sales representatives of Wondermist polish, made by the Wondermist Mfg. Co., Boston, Mass.; Woodworth tire and bead spreaders, made by the Allied Industries Corp.; King crank holder and McCulloch timer, made by the A. P. McCulloch Machine Co., Boston, Mass. Other items will be added to the line from time to time. The officers are: President, Alfred I. du Pont; vice-president and general manager, J. N. Nixon; vice-presidents, L. P. Lawrence and R. H. Michels; and secretary-treasurer, G. W. Fay.

Blood & Wright, who specialize in automotive service at Detroit, have been appointed exclusive representatives in Michigan for the Nemours Trading Corp. and are also Michigan representatives for the K. & S. lock. They are opening a sales and installation store in Detroit for lock business exclusively.

—

COMPLAINT AGAINST TONKHEIM

FORT WAYNE, IND., June 13—Complaint against the Tonkheim Oil Tank & Pump Co., manufacturers of automatic measuring oil pumps, has been made by the Federal Trade Commission, charging that this concern systematically entices the employees of its competitors "with the purpose of annoying, embarrassing and obstructing them in their business." The company was cited to appear before a commission in Washington, July 22.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

934 FORDSON SALES IN MAY

NEW YORK, June 14—Continued heavy rains interfered with tractor sales during April, according to C. L. Herring, president of the Herring Motor Co., handling Fordson tractors in Iowa, Nebraska and South Dakota. Fordson sales in this territory for May totaled 934, as compared with 1340 in April. As May is not considered a tractor selling month it would scarcely be correct to infer that tractor sales have been slow this year.

There are approximately as many Fordsons sold in Iowa as in Nebraska and South Dakota combined. The sales in Nebraska are approximately double those in South Dakota. On this basis 156 were sold in South Dakota, 312 in Nebraska and approximately 476 in Iowa.

—

MOLINE PLOW FOUNDRY

MOLINE, ILL., June 17—The Moline Plow Co. is building a foundry at East Moline to cost $275,000. The contract calls for the completion of the structure by Oct. 15. The building will be 2 stories, 120 by 380, of reinforced concrete and steel. Tractor and agricultural implement castings will be produced at the new plant.

—

NEW CAR AND TRACTOR

PHILADELPHIA, June 17—The L. M. Heifner Manufacturing Co., with L. M. Heifner at the head, is being formed with a capital of $1,500,000, to manufacture cars and tractors. An option dating from July 1 has been taken on a building in Chester, Pa., having 100,000 sq. ft. of floor space, and operations are expected to begin by August 15. The tractor to be made will be composed of standard units, especially suitable for small farms, and will cost $1000. It will be designed to be used with a 2-bottom plow, having a clearance of 27 inches. Production of 3000 the first year is the goal.

All types of passenger cars are planned, having the following specifications: aluminum body, Continental Red Seal engine, 128-in. wheelbase, Bosch magneto, Brown-Lipe transmission, Borg & Beck clutch, Spicer universals, Timken axles, Parish & Bingham Co. frame, Perfection springs, Stewart vacuum feed, Fedders radiator, Delco starting and lighting system. The color will be optional.

The Smith-Davis Machinery Co., Market and 21st streets, of which Mr. Heifner is general manager, will represent the new line in Eastern Pennsylvania, New Jersey, Delaware, and part of Maryland.

BUILDING CANADIAN PLANT

OSHAWA, ONT., June 14—General Motors of Canada, Ltd., as planned, is erecting a 60 x 160 ft. plant at Walkerville, where engines, transmissions and all heavy parts of cars used in the Oshawa assembling plants will be manufactured. These operations are going ahead rapidly. For the time being motors, transmission, etc., for McLaughlin cars, Chevrolet cars and trucks and Oldsmobile cars and trucks will be made in Walkerville. Castings, engines and transmissions for Samson tractors and G.M.C. trucks will also be turned out.

In Oshawa, where McLaughlin and Chevrolet cars are now made, a 400 x 80 ft. 4-story building will be erected to assemble Oldsmobiles and trucks. It is planned to start production this fall.

In addition to this plant it has been decided to erect a central shipping building, 200 x 80 ft. In conjunction with this central shipping station there will be a large storage building with a capacity of 1000 cars. This building will be 4 stories, 400 x 80. An enameling plant to be erected will be 3 stories, 300 x 80 ft.

In addition there will be alterations in the present plant equipment of the General Motors unit at Oshawa. The south building, now used for Chevrolet parts and general storage, will be converted into a manufacturing plant to produce the Baby Grand Chevrolet model.

The ground under the present 490-ft Chevrolet assembling plant will be excavated and a basement put under the entire space, thus adding one complete story.

All buildings are of steel and concrete.

—

G.M.C. CAPITAL $1,020,000,000

NEW YORK, June 16—Increase of the capital stock of the General Motors Corp. from $370,000,000 to $1,020,000,000 was voted at a stockholders meeting at Wilmington, Del., June 12. The stock division calls for $20,000,000 preferred, $500,000,000 debenture and $500,000,000 common shares.

The increase, according to John J. Rashob, director of the corporation, is intended to enable the company to take advantage of any opportunity that may develop in the motor field, extensions of plants being financed out of earnings rather than stock sale proceeds.

Reports that the enlarged capitalization would provide funds for absorption of the Ford Motor Co. were denied.

—

ACME TRUCK PRICES ADVANCE

CADILLAC, MICH., June 16—The Acme Motor Truck Co. will raise the price of its 3½- and its 5-ton models $100 each, effective July 1. The following is the new price schedule:

Capacity	New Price	Old Price
1-ton	$1,950	$1,950
2-ton	2,750	2,750
3½-ton	3,750	3,650
5-ton	4,850	4,750

Fisher Body Corp. Earns $1,603,289

DETROIT, June 16—The Fisher Body Corp. and its subsidiary, the Fisher Body Corp. of Canada, earned $1,603,289 last year after deducting interest, federal taxes and appropriation for dividends on the company's outstanding preferred stock. This earning is equivalent to $6.44 a share on the company's 200,000 shares of common stock of non par value.

Before deducting the federal tax, but deducting all expenses of the business, including expenditures for repairs, maintenance of the properties and an adequate allowance for accruing renewals and depreciation, the net earnings were $3,534,853.38. Interest deductions were $306,564.08 and the amount set apart for federal income and war excess profit taxes was $1,625,000.

The consolidated balance sheet lists assets aggregating $20,352,001 on April 30, 1919, with current assets of $12,889,-541.37, and current liabilities of $8,635,-265.76, indicating net working capital of $4,254,275.61. Investment in plant and properties after writing off $864,687.10 for depreciation and including $250,000 as the value of patents, was $320,813.97. Sinking fund assets for redemption of preferred stock amounted to $60,054.55 and deferred charges were $81,591.21.

Current assets comprise inventories of raw material work in progress and supplies appraised at $6,693,044.70, accounts receivable $2,589,092.54, investment in Liberty bonds at par $1,500,000 and cash $2,107,404.13.

Current liabilities include bank loans aggregating $4,065,000, of which $1,475,-000 was for the purchase of Liberty bonds; accounts payable, $1,429,579.19, a balance of $251,503.31 due the U. S. government on airplane contracts, accrued salaries and payrolls $822,190.35, accrued interest $7,007.19, and provision for Federal taxes and Canadian business profits war tax, $2,059,985.72.

Capital liability was $6,445,324.98, consisting of $6,000,000 authorized 7 per cent cumulative preferred stock, of which $5,000,000 was issued and $666,000 retired, leaving $4,344,000 outstanding and 200,000 shares of common stock of no par value, which is given a book valuation of $2,111,324.98.

From surplus of $4,309,568.32 on May 1, 1918, there was deducted $403,000 additional provision for federal taxes of 1918. The balance was increased by $1,298,750.40, the part of the year's net earnings remaining after appropriating $304,538.80 for payment of preferred stock dividends, also by $66,091.66, the surplus arising from the retirement of preferred stock at a discount, making total accumulated surplus $5,271,400.36, on April 30, 1919.

—

CHIEF MOTORS ISSUES STOCK

PORT HURON, MICH., June 12—The Chief Motors Corp. has placed on sale 20,000 shares of 8 per cent participating preferred stock and 20,000 shares of common stock. The par value of both stocks is $10. According to the sales plan, one share of preferred and one share of common is selling for $12.50.

The company is raising additional capital to increase its production so that enough engines may be produced to fill orders already received. The Chief Motors Corp. builds a kerosene-burning tractor engine, and has assets totaling approximately $400,000, not including good-will, organization and other tangible assets.

John Erd, formerly of the Erd Motor Corp., Saginaw, Mich., is president and general manager of the Chief Motors Corp. The corporation has opened sales offices in Detroit.

—

HOLT COMPLETING PLANT

PEORIA, ILL., June 17—Orders were received this month to complete the addition to the Holt Caterpillar tractor plant at East Peoria, Ill. The buildings were partially finished when peace was declared and the work of construction has since been halted. It will require $1,000,000 to complete the plant according to the original plans. Capt. J. E. Hopkinson, of the regular army, will be assigned to duty at the Holt works and supervise the expenditure of the additional sum. The total cost of the plant will be $3,000,000.

—

TIRE PLANT FOR WARREN

WARREN, OHIO, June 17—Construction will commence immediately on the D. & M. Cord Tire Co., Cleveland, rubber plant here, to cost $2,500,000. The company was recently organized, with Walter D. Myers, attorney and banker, of Cleveland, president, and Walter R. Denman, secretary and general manager.

The plant here will manufacture cord tires, inner tubes and accessories. It will start with a single unit employing 500 and turning out 1000 tires a day. Eventually it will consist of three units with a daily capacity of 4,000.

—

WALLIS TRACTOR RESUMES

RACINE, WIS., June 12—The Wallis Tractor Co. resumed operations June 2 with a large force and on a greatly increased production schedule, after being closed down for a month, during which time the entire plant was overhauled. The Wallis company from now on is operating on an 8-hour-day basis, without overtime. Rates have been established which take into consideration present living conditions, and the voluntary proposition is meeting with the approval of all employees.

—

MACHINE SHOP FOR KALAMAZOO

KALAMAZOO, Mich., June 16—The Kalamazoo Motors Corp. is erecting a 1-story machine shop covering about 2000 sq. ft. A covered loading and unloading platform is included. Plans also provide for a building for the stock room. These changes will double the capacity of the present plant and permit the assembling of 125 to 150 trucks a month.

Army Trucks Cross Country

WASHINGTON, June 16—The first transcontinental trip of an army motor truck train will start from Washington, July 7, under direction of the Motor Transport Corps, and end at San Francisco within two months. Before the trucks start on this journey, which is intended to provide tests of the standard motorized army equipment, demonstrate long distance motor post and commercial transportation, and provide for other studies and training, President Wilson will dedicate a milestone in front of the White House to represent the starting point for highways radiating out of Washington. The train will follow the Lincoln Highway as far as possible. It will comprise two complete motor transport corps companies, include 5 passenger cars, 35 trucks of all army types, 2 ambulances, 6 motorcycles, 2 tank trucks, 2 kitchen trailers, 2 water tank trucks, 1 engineer shop truck and 1 searchlight truck.

Technical personnel from the motor transport corps, engineer corps, medical corps, field artillery and air service will make the journey.

—

ARMY EQUIPMENT FOR HIGHWAYS

WASHINGTON, June 14—The Department of Agriculture will receive tractors, road rollers and other highway building equipment from the American Expeditionary Force as quickly as it can be returned. The War Department has ordered shipment of this machinery from France at the request of the Department of Agriculture, which will use it in the construction and maintenance of federal highways. The equipment will be distributed to the states without charge, and apportioned together with the 27,000 army trucks which are being distributed by the Bureau of Public Roads at the request of the State Highway Department.

The equipment being returned from France includes 1500 tractors, 400 road rollers, steam and gas driven, concrete mixers, graders, rock crushers, electric motors, industrial locomotives, dump cars and quantities of smaller equipment.

—

TRANSPORTATION NEEDS

WASHINGTON, June 14—The Highway Transport Committee of the Council of National Defense has requested the assistance of congressmen in determining the necessary routes for the operation of rural motor express. In a letter addressed to members of Congress, the committee points out the need for every form of transportation at this time, and numerous examples of districts in which the transportation facilities are inadequate.

In various southern districts, it is stated, hundreds of bales of cotton are lying on the ground without cover because of lack of transportation, while in the Northwest millions of bushels of grain lack transportation to move them.

UNIVERSAL AVIATION CO. FORMED

DETROIT, June 14—The Universal Aviation Co. has been incorporated here for passenger service between Detroit and Cleveland, and to afford the public opportunity for pleasure trips in Michigan, Ohio and Indiana.

The officers and backers of the new enterprise are: President, Henry M. Leland, president of the Lincoln Motors Co.; first vice-president, E. E. Allyne, president of the Aluminum Castings Co., Cleveland; second vice-president, David Pell, director of the Hayes Mfg. Co., Detroit; secretary and treasurer, Harry D. McCullough, secretary and treasurer of the King Motor Car Co.; general manager, J. T. Patterson, Detroit; C. W. Leland and Le Roi J. Williams of the Lincoln Motors Co.; Frank P. Book of the Book estate; J. W. Murray, president of the J. W. Murray Mfg. Co.; Hal Smith of the Hayes Mfg. Co.; C. H. Haberkorn of the Haberkorn Furniture Co.; George D. Wetherbee, Thad Leland, Harold Armstrong, C. R. Short, chief engineer of the Northway Motors Co.; Clarence Chandler, B. F. Bertram and Messrs. Ryan and Sweeney of the Allyne-Ryan Co., Cleveland, and Harry D. Mills of Ann Arbor.

Land flying activities will begin immediately at Morrow Field, with four airplanes of the Curtiss type. Six more machines have been ordered. The company has two flying boats, which will land at the foot of Townsend Avenue. The pilots, all of whom have been in Government service, are S. H. Dicran, Edward Wismiller, C. R. Sinclair and C. R. Griffin.

—

$5,000,000 HOUSING CONCERN

DETROIT, June 12—Eugene W. Lewis, former vice-president of the Timken-Detroit Axle Co., and a director of the First & Old Detroit National Bank, has been elected president and general manager of the newly organized $5,000,000 house financing corporation of Detroit. This company, organized by leading bankers and manufacturers, aims to solve Detroit's serious housing situation, and incorporation papers will be filed at Lansing within a few days. Up to the present time Detroit has had no organization with facilities for transacting and disposing of all features of the problem of financing and building of homes. It aims to give the man with a few hundred dollars with which to start a home an opportunity to build on the easy-payment plan. It is estimated that Detroit has a shortage of approximately 60,000 homes.

On the board of directors are many men well known in the automotive field, including Frank L. Klingensmith, vice-president of the Ford Motor Co.; Alvin Macauley, president Packard Motor Car Co.; H. W. Alden, vice-president Timken-Detroit Axle Co.; D. A. Brown, president General Necessities; James Inglis, president American Blower Co.; R. B. Jackson, general manager Hudson Motor Car Co.; A. L. McMeans, secretary Dodge Brothers; A. W. and John R. Russel of the Russel Motor Axle Co.; James T. Whitehead of Whitehead & Kales Iron Works.

Housing Situation in Industry Still Critical

BATTLE CREEK. MICH., June 14—Five hundred new homes are needed here immediately to care for the increased population. The Chamber of Commerce is securing bids upon the construction of four different types of houses. The banks and private loan associations are co-operating by loaning money for home building on an easy payment plan. At the present time the manufacturing companies are not actively engaged in relieving the situation, but plans are under way which will result in the manufacturers building houses for their own employees.

—

PORT HURON NEEDS HOMES

PORT HURON, MICH., June 14—There is a shortage of from 300 to 400 homes here. The Chamber of Commerce is endeavoring to form an organization for the purpose of building 200 small homes for foundry employees. Several of the large manufacturing companies are also contemplating building homes for their workers. The building and loan associations and the banks are aiding in this campaign and a great number of individual parties have been financed.

Over $3,000,000 has been expended in additions to industrial plants. Upwards of 8000 persons have been added to the population in the last 2 years, with less than 300 homes constructed. The general demand is for homes renting from $15 to $25. It is estimated that 82 per cent of the men employed in industries own their own homes.

—

MORE HOUSES FOR SAGINAW

SAGINAW, MICH., June 14—Saginaw is responding to the demand for more houses for hundreds of families brought here by new and growing industries. During May 83 building permits were issued, besides three for factories. The total cost was $467,157.

—

JACKSON BUILDING HOMES

JACKSON, MICH., June 14—To relieve the serious shortage of homes here, the Jackson Co-operative Realty Co. is about to incorporate for $200,000, its mission being to build homes for workingmen. This company has been organized for several months and has already built 45 houses.

—

HOMES FOR PORT HURON

PORT HURON, MICH., June 14—The organization of a home building corporation capitalized at $1,000,000 is the plan proposed for the relief of the serious housing situation here.

The company will buy vacant lots and build houses where prospective purchasers desire, and will sell on the installment plan with easy payments. The sale will be at cost of lot and building plus 15 per cent, and if the purchaser keeps up the payments for 5 years the profit will be reduced.

500 HOMES NEEDED IN ANN ARBOR

ANN ARBOR, MICH., June 14—According to real estate dealers the city needs at least 500 homes. It is thought that the manufacturing interests will attempt to formulate a relief plan, inasmuch as they are all in need of men, whom they are unable to obtain because of dwelling shortage.

—

BAY CITY, MICH., June 14—This city proposes to build 800 new homes this year. The Chamber of Commerce is drafting plans to provide homes. It is asking its members each to build from 1 to 50 modern homes to sell on monthly payments at 6 per cent interest. A number of wealthy citizens' associations, etc., have agreed to this and a complete building program will be drawn up.

—

KALAMAZOO, MICH., June 14—Kalamazoo expects the housing situation to greatly improve within the next 30 days. There is a big shortage of houses here. The Chamber of Commerce has organized a committee and it is estimated that between 300 and 500 new dwellings will be put up.

—

AKRON ADDS DWELLINGS

AKRON, June 14—The Akron Home Owners' Investment Co. will start work in 10 days building 5000 homes at a cost of $25,000,000. All homes will be completed before the end of the year. This association was recently organized to care for the critical housing situation here. In addition to the building work the company will make loans to those who wish to build their own homes, on an easy payment plan. The cost of the houses to be erected will average $5,000 each. The work of the association will not conflict with that of the various industrial plants which are planning housebuilding campaigns of their own. It is estimated that by the end of the year Akron will have 9000 new dwellings.

The Coventry Land Co. has issued contracts for the construction of 100 houses to cost approximately $500,000. They are to be built in the Firestone park.

—

NEW DETROIT HOUSING CORP.

DETROIT, June 14—A new housebuilding corporation, the Banker's Land & Investment Corp., capitalized at $1,000,000, is preparing to aid Detroit in solving the critical housing situation. The company has opened offices and construction work will start at once. Within 12 months the corporation hopes to provide housing accommodations for at least 3,000. This concern is a merger of six operating subdivision and building companies controlled by Frederick H. Zeigen.

The officers of the corporation are: president and general manager, F. H. Zeigen; vice-president, Clarence E. Wilcox, Detroit corporation counsel; secretary, Leslie B. Robertson, former head of the Ford Motor Co. legal department; treasurer, Richard D. Cudmore, cashier of the People's State Bank. Cass Zeigen, former assistant auditor of Maxwell-Chalmers, is auditor.

Calendar

SHOWS

Aug. 30-Sept. 6—Minnesota. State Fair.
Sept. 1-6 — Indianapolis, Ind. State Fair, Cars and Accessories, Indianapolis Automobile Trade Assn., John B. Orman, Manager.
Sept. 13-20—Cincinnati, O. Ninth Annual, Music Hall, Cincinnati Automobile Dealers' Assn., H. K. Shockley, Manager.
Sept. 15-20 — Springfield, Mass. Eastern States Exposition.
*Oct. 9-19—Paris. Grand Palais. International Automobile Mfrs. Congress.
Nov. 7-16—London. Olympia Motor Car Exhibition—Society of Motor Mfrs. and Trades.
December — Brussels. International Automobile Mfrs. Congress.
Jan. 3-10 — New York, N. Y. Grand Central Palace, National Automobile Chamber of Commerce, S. A. Miles, Manager.
Jan. 24-31—Chicago, Ill. Coliseum, Cars; Drexel Pavilion, Trucks; National Automobile Chamber of Commerce, S. A. Miles, Manager.
January — New York. International Automobile Mfrs. Congress.
February — Chicago. International Automobile Mfrs. Congress.
Feb. 23-Mar. 6 — Birmingham, Eng. British Industries Fair.

TRACTOR SHOWS

July 14-19—Wichita, Kan. Automotive Committee of National Implement Assn.
July 28-29—Columbus, O. Tractor show in charge of Prof. H. C. Ramower, head of agricultural engineering department of Ohio State University.
Aug. 1-2 — Piqua, O. Tractor show in charge of Prof. H. C. Ramower, head of agricultural engineering department of Ohio State University.
Aug. 18-22—Aberdeen, S. D. Sectional Tractor Demonstrations.
October—Ottawa, Ont., Can. Interprovincial Plowing Match and Tractor Demonstration.

CONTESTS

July 4—Hohokus, N. J. Dirt Track Event.
July 4—Tacoma, Wash. Annual speedway races.
July 4—Atlantic City, N. J.—Airplane races—Aeronautic Convention.
*July 19—Uniontown, Pa. Speedway race.
*July 26—Sheepshead Bay, L. I. Speedway race.
*Aug. 15 — Middletown, N. Y. Dirt track event.
*Aug. 22-23—Elgin, Ill. Road race.
*Aug. 23—Sheepshead Bay, L. I. Speedway race.
*Sept. 1—Uniontown, Pa. Speedway race.
*Sept. 20—Sheepshead Bay, L. I. Speedway race.
*Sept. 27—Allentown, Pa. Dirt track event.
*Oct. 1—Cincinnati, O. Speedway race.
*Oct. 4—Trenton, N. J. Dirt track event.
*Oct. 11—Danbury, Conn. Dirt track event.

*Tentative dates.
†Sanctioned.

CONVENTIONS

June 16-19—Detroit. American Society of Mechanical Engineers spring meeting. Hotel Statler.
June 23-28—Ottawa Beach, Mich. S. A. E. Mid-summer Meeting.
July 9-10—Buffalo. Motor and Accessory Mfrs. Assn. Mid-summer convention.
Sept. 22-24—Philadelphia. Annual Convention, National Association of Purchasing Agents. Bellevue - Stratford.
May 12-15, 1920—San Francisco. Seventh National Foreign Trade Convention.
January — Washington. Pan American conference.

De Palma in Packard Victor on Sheepshead Speedway

SHEEPSHEAD BAY SPEEDWAY, N. Y., June 14—Ralph De Palma, driving a 12-cylinder Packard, won the International Sweepstakes here to-day, covering the 50-mile course in 26:23:4, and establishing a new record for the track of 113.76 m.p.h. Ralph Mulford, in a 4-cylinder Frontenac, and Tom Milton, in a 4-cylinder Duesenberg, made local records in the 30 and 10-mile events, their times being, respectively, 16:01:20 and 5:20:20. Mulford also carried off the honors in the special 10-mile race.

Dave Lewis came in second and Joseph Boyer, Jr., third in the 50-mile event. Ralph Mulford was in second place and De Palma in third in the first race, a 10-mile event, which Tom Milton won. De Palma made second place and Joseph Boyer, Jr., again third in the 30-mile run, and in the special 10-mile event, which was won by Mulford; Joseph Boyer was second and Ralph De Palma third.

The winning Packard, equipped with a 24-valve engine with cylinders cast in threes, has a total piston displacement of 299.2 cu. in. The bore and stroke of the engine are 2 21-32 and 4½ in., respectively. The valves are located in the head, the pistons are of aluminum and there are two camshafts. The car has a 112-in. wheelbase and is equipped with the Delco ignition system.

The Frontenac, driven by a 16-valve engine of 3.87 in. bore and 6 in. stroke, has a 282.3 cu. in. piston displacement. The cylinders are cast in block, with valves in the head. The engine has a single camshaft, aluminum pistons, cone clutch and Bosch magneto. Its wheelbase in 110 in.

The Duesenberg also is equipped with a 16-valve engine, having the valves located in the head. The bore is 3¾ in., strokes, 6¾ in. and the piston displacement is 298.2 cu. in. It has two camshafts. The pistons are of Levett metal. Its other features include a cone clutch and Bosch magneto. The wheelbase is 116 in.

126,136 Motor Vehicles Held by A. E. F. According to Classified Inventory in Hanch Report of Trip Abroad

NEW YORK, June 16—A total of 126,136 motor vehicles, trailers and bicycles was in the hands of the A. E. F. in France, according to an analysis given by C. C. Hanch in his report to the National Automobile Chamber of Commerce recently. The report says that of this number, 7,368 were of foreign make, representing our purchases in Europe, practically one-half of which are motor trucks. We purchased 2,603 3 and 4-ton trucks from European makers.

The recapitulation is:

Type	American	Foreign	Total
Passenger cars	9,091	718	9,809
Light deliveries	10,110	41	10,151
½ and 2-ton trucks	12,651	681	13,332
3 and 4-ton trucks	19,285	2,603	21,888
5-ton trucks and over	2,696	78	2,774
Motorcycles	21,597	1,195	22,792
Ambulances	7,080	9	7,089
Tractors	144	125	269
Caterpillars	1,721	....	1,722
Trailers	3,745	1,552	5,297
Machine shop and repair trucks	1,575	16	1,591
Kitchen trailers	352	33	385
Omnibuses	14	3	17
Winch trucks	....	69	69
Reconnaissance cars	745	...	745
Fire engine and disinfectors	20	27	47
Laboratories	86	52	138
Machine shop trailers	94	15	109
Tank trucks	869	151	1,020
Anti-aircraft	20	....	20
Miscellaneous trucks	5	....	5
Bicycles	26,867	....	26,867
Total	118,768	7,368	126,136

GEORGIA DEALERS ORGANIZE

MACON, GA., June 14—Automotive dealers of this state have condemned a proposed bill to be introduced in the next legislature to assess truck license fees as high as $1,000 and $1,500 on trucks of 5- and 7-ton capacity. They are also against the Federal practice of confiscating cars carrying liquor. In order to handle these and other problems the Georgia Automotive Dealers' Association has been formed with about 200 members. R. C. Dunlap of this city is president. Harry C. Moock, St. Louis, business manager of the National Automobile Dealers' Association, spoke at the organization meeting.